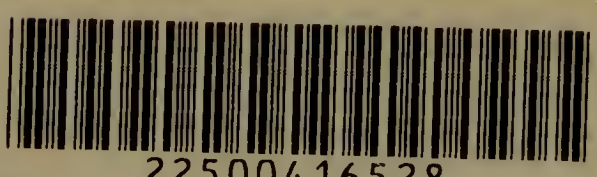
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Exposition and Illustration

in

Teaching



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Exposition & Illustration

in

Teaching

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CHAPTER I

NATURE AND SCOPE OF EXPOSITION AND ILLUSTRATION

APPLYING the principles to be laid down in what follows, it is well to make a beginning in some region of knowledge that is common to all intelligent educated people. A good dictionary may be fairly taken to represent such a region. What the dictionary tells us about Exposition and Illustration will probably be admitted to be common property, and therefore a suitable starting-point for a treatment that will introduce points of view that may be unfamiliar to the reader. In teaching it is now generally admitted that we ought rather to lead up to a definition than to start from one. In what follows, the definitions as found in the dictionary will not be treated as ends in themselves, but merely as the common basis from which reader and writer may make an intelligible start. This chapter will concern itself not so much with the explanation of the definitions which it borrows from the dictionary as with the elaboration of the connotation of the terms Exposition and Illustration in their relation to teaching.

In Dr. James A. H. Murray's "New English

Dictionary on Historical Principles" we find under the word *expound*, the following meanings:—

1. To set forth, declare, state in detail (doctrines, ideas, principles; formerly used with wider application).
2. To explain, interpret:
   (*a*) *gen.* To explain (what is difficult or obscure); to state the signification of; to comment on (a passage or an author.)
   (*b*) *esp.* To interpret, comment upon (Scripture, religious formularies, &c.). Now chiefly with reference to homiletic exposition.

We may safely neglect the more literal meanings attached to Exposition, such as: "putting out of," "exposure," "putting to public view"; just as we need not seriously consider the archaic use in *Hudibras*: "He expounded both his pockets." So far as the teacher is concerned, two of the accepted meanings stand out as of importance: "to set forth," and "to explain or interpret." In the ordinary practice of the school-room these two meanings are not usually distinguished from each other, because as a matter of fact the purpose of setting forth anything is to explain it to the pupil. If we set a matter clearly before another, we feel that we have explained it. If to a wayfarer we set forth his route, we feel that we have explained a matter about which he was in doubt. A clear statement of the Binomial Theorem is generally regarded as in some sort an explanation of that theorem. There are those who question whether the teacher can under any circumstances do more than make just such a presentation. Jacotot, the founder of the "Universal

Method" of teaching, is usually true to his reiterated principle that "a teacher is never necessary to man";[1] but in a moment of unusual generosity he admits that: "A teacher is useful to men, he is necessary to children, but a teacher who explains [*un maître explicateur*] is deadening [*abrutissant*]."[2] The negativeness of the teacher's work from this point of view is obvious. In the words of one of Jacotot's editors: "In fact, the Founder limits himself to saying: 'Here is a book: learn Latin.'"

But while the two meanings of Exposition—setting forth and explaining—to a certain extent overlap, they imply a real distinction that is worth the teacher's attention. While we are mainly interested in discovering how to present certain matters in the way best suited to render them intelligible to the pupil, we are none the less setting them forth. The first meaning of Exposition, in fact, implies the presentation of new matter, the second the explanation or interpretation of matter already known to but not yet fully understood by the pupil. The first meaning "setting forth" corresponds to what is usually understood in school and college by the verb *demonstrate*. This word, which literally means to show or point out, has acquired the added connotation of "for a purpose." A demonstrator in a college is not a man who points out merely, but one who shows the meaning of what he points out. As the dictionary has it, he "exhibits and explains." Still, the fact remains that in both the first meaning of *expound* and in the general meaning of *demonstrate* there is the notion of supplying new matter, so that this presentation of new

[1] *Enseignement universel*, p. 304.

[2] Avant-propos de cette quatrième édition, *De la langue maternelle*.

matter may be regarded as an essential part of Exposition, though it need not be found at all stages of Exposition. We shall see when we come to deal with Illustration that the same distinction arises between the introduction of new matter and the manipulation of old.

It has to be observed that for our present purpose we are treating the subject of Exposition from the point of view of the teacher. It is possible to regard it entirely from the pupil's standpoint. When this is done, Exposition is dealt with as a part of composition, and ranks as co-ordinate with narration and description. As such it enters into the ordinary school curriculum, and especially in America receives a considerable amount of attention. Naturally the principles of Exposition must remain the same whether practised by the pupil or by the teacher, but the conditions under which the principles are applied in the two cases are so different, that a separate treatise is required for each.[1]

It will be noted that the dictionary lays stress on the fact that the things to be set forth are "doctrines, ideas, principles," the obvious inference being that Exposition has nothing to do with material things, that we can no more expound a steam-engine than we can expound our pockets. But while it is bad English to speak of expounding a locomotive, we may correctly speak of expounding the principles on which the locomotive works. This does not after all mean that the concrete is removed from the realm of Exposition, but merely that Exposition can deal with the concrete only in terms of ideas. The contributions of the senses must be taken for

[1] For a treatment of the subject as a part of the curriculum see *Exposition in Class-Room Practice*, by Mitchill and Carpenter. The Macmillan Co., New York, 1906.

granted by the expositor. His business is so to arrange the mental results of sensations that they shall form a well-organised and therefore intelligible whole. From this point of view all Exposition is explanation or interpretation, though in order to complete the explanation it may be necessary to place the pupil in such a position that new matter may be assimilated. Sometimes the expositor can so arrange old matter that it becomes intelligible without the introduction of anything new, but frequently it happens that in the pupil's knowledge there is some link lacking, without which all the present material is necessarily unintelligible. To introduce the missing elements is clearly an essential part of Exposition. I have known a man who had a really excellent knowledge of French completely puzzled by a passage that presented no apparent difficulty. He could make no sense out of it because he did not happen to know that *Monsieur* when used absolutely meant the eldest brother of the King of France.

It is worth remarking that in this connection "explanation" has no reference to the ultimate meaning of the matter to be dealt with. It is not a metaphysical term. Accordingly, from the teacher's point of view Exposition does not include the discovery of the true meaning of the matter to be expounded, but only the setting forth of that matter in such a way as to be intelligible to the pupil. The facts and the explanation of the facts are for the teacher the data of Exposition. He may be misinformed about the materials he is dealing with, his facts may not be facts, his explanations of his facts may not stand the test of investigation, and yet his exposition may be excellent. As an expositor his business is so to

present his facts that they shall carry with them the explanation that appeals to him as satisfactory. Too often it has been assumed that an intelligent mastery of the facts to be presented is enough to qualify a teacher for his work.[1] In reality it is no more than the essential condition to his beginning to learn to apply his art. For our present purpose we shall assume that the teacher has acquired the necessary facts and has mastered their meaning. The problem remains to communicate these facts so that they shall convey to the pupil the meaning the teacher has accepted as the true one.

The teacher may not only adopt a wrong interpretation of the facts, but may know that his interpretation is false, and yet be an excellent expositor. Professor J. W. Allen[2] provides an admirable illustration. Taking the Reformation as subject, he gives three separate expositions of its meaning, one from the Roman Catholic point of view, another from the Protestant, while the third is written from the standpoint of a critical Mercutio who calls for "a plague o' both your houses." By appropriate over-emphasis and compression, each of the accounts, while not inventing incidents or what are commonly called "facts," contrives to convey an entirely different impression from the others. So far as each is successful it leaves the mind of the pupil with his ideas of the Reformation reconstructed in a particular way, a way that was first developed in the mind of the expositor, though, as we see, this expositor has adopted at least two other modes of reconstructing the available elements.

[1] Cf. De Quincey: "The τὸ *docendum*, the thing to be taught, has availed to obscure or even to annihilate for their eyes every anxiety as to the mode of teaching." *Essay on Style.* Collected Writings (Masson, 1897), vol. ii. p. 160.

[2] *The Place of History in Education*, p. 210.

The test of the expositor is, does he produce on the mind of the pupil the impression he desires to produce? Literary style is sometimes tested by the clearness with which it conveys the author's meaning. But sometimes the author may not desire that his meaning should be understood. He may want his words to convey one meaning to one set of readers and another to another. From this point of view the test is: does he convey the meaning to each that he intended to convey? Style is not so much a means of making another know what we think, as it is a means of producing a certain effect upon the mind of another. So in the case of the expositor, whether he be honest or dishonest, the result of successful exposition must be that there now exists in the mind of the hearer or reader a combination of mental elements that previously existed in the mind of the expositor. There may be many other ways in which the elements could be combined, and these possible combinations may all have been formed at one time or other in the mind of the expositor, but if he has succeeded in his present work, only one of these combinations is able to establish itself in the mind of the person he is dealing with. Exposition, therefore, comes to be in the ultimate resort the manipulation of the ideas of another.

This gives a more definite meaning to the term *explanation* as used by the teacher. Some people do not see how things can be explained. They admit the advantage of statement and demonstration; but cannot see how something that has been stated and demonstrated can be made clearer by writing or talking about it. They quote the case of the little girl who has won the goodwill of all the teachers' common rooms in the world by her

protest that she thought she could understand her arithmetic if only her mother would give up explaining it.[1] In his *Modern Painters* Ruskin tells us bluntly: "Explanations are wasted time. A man who can see, understands a touch; a man who cannot, misunderstands an oration." The contrast between a touch and an oration is not very happy, as it might be held to imply a comparison between two different kinds of explanation—practical and verbal. But even if we limit the contrast to the cognate terms *a word* and *an oration*, we have still the implied admission that the *word* has done some good. In actual experience it is often found that only a word is needed to establish the proper relation among a group of ideas that need nothing but the help of this word to reduce themselves to a combination intelligible to a person who otherwise is unable to understand them. It is possible for a man to have in his mind all the facts necessary to explain something that he does not understand, and yet be quite unable to make the necessary application of his knowledge. The facts must be put in a certain order before the true relation can be seen, and it is the business of the expositor by means of words or otherwise to arrange them in this order.

One of the great difficulties at certain examinations is to keep candidates from getting just this kind of help from each other. A difficult problem in Perspective or in Orthographic Projection often becomes quite easy to a candidate from a single glance at his neighbour's completed drawing, though

[1] In his *Charles Dickens*, Mr. G. K. Chesterton says Dickens "had one most unfortunate habit, a habit that often put him in the wrong even when he happened to be in the right. He had an incurable habit of explaining himself."

without that glance he could make no sense out of the problem as stated in words on his examination paper. He has all the knowledge needed to work out the problem, but he lacks the power of making the initial combination. At a certain examination in Applied Mathematics an industrious but not very original student found herself unable to understand a particular question on her paper till she chanced to see a fellow candidate twirling her finger in a particular way. The motion of the finger at once suggested the idea of a left-handed helix, and the point of the question became plain. Both candidates happened to be considering the same problem at the time; but there was no intentional signalling. The clever candidate did not know that she had helped the other. It has to be remembered that unless the duller student had had the necessary materials in her mind, no amount of finger twirling would have been of the slightest use to her.

In a similar way an unintelligent plumber has often in his mind all the facts that are necessary to the mastery of a difficult job in a house, and is yet unable to apply his knowledge. The householder makes several suggestions, most of them futile, but happens to hit upon one combination that appeals to the practical but unintelligent workman, who then exclaims: "Ah, now that you put it that way—" and proceeds to carry out a suggestion that he could not originate. In a certain sense the ignorant householder has explained matters to the plumber. What the householder has done more or less by chance, the skilful expositor must do deliberately.

Exposition may well be described as a bi-polar process. For our own ends we may regard it now from the point of view of the expositor, and now

from that of the person to whom something is being expounded. But the process is working from both sides all the time. It is interesting to note that at the present moment psychologists are feeling keenly the need for double terms in the case of similar bi-polar processes.[1] In suggestion and imitation, for example, we have the two poles of the process, and a term to describe only one of them. *Suggester* and *imitator* are words that stand for the persons who suggest or imitate; but we have no terms to denote those who are imitated or to whom suggestion is made. In the books we find rather clumsy references to the *subject*, the *patient*, the *pattern*, the *model*. Sometimes it is proposed to follow certain analogies and boldly introduce the two terms *suggestee* and *imitatee*. But apart from the barbarous sound of *expositee* or *expositatee*, there is the serious objection that this form over-emphasises the passive element. The person to whom an exposition is being made is to a certain extent more passive than is the expositor, but he is far from being quite passive. He is guided by the expositor, and to that extent plays a passive part; but if the exposition is to be successful, the person to whom the expositor appeals must bestir himself, and react vigorously on the material supplied by the expositor.

In what follows I shall have to make constant reference to "the person to whom the exposition is to be made," and it is obvious that this cumbrous periphrasis cannot be repeated on every occasion. So with "the matter to be expounded." In both cases we require a technical term. With regard to the matter to be expounded we seem to have a word to our hand. Sheltering under the authority

[1] Cf. Mr. W. Macdougall's *Social Psychology*, p. 325.

of De Quincey's use of τὸ *docendum*, the thing to be taught, I would suggest the term *expositandum*, the thing to be expounded. By dropping the Greek τὸ we render the term a little less formidable, and lose nothing in the way of accuracy. We have seen that no such convenient term suggests itself for the person to whom the exposition is to be made. Probably it will be best to retain the ordinary word *pupil*. To be sure the word is not commonly applied to a person who has left school, and we must in these pages apply it on occasion to people of quite mature years and high attainments; but no confusion need arise if we clearly understand that by *pupil* we shall in this book indicate the person who in the process of exposition occupies the pole that is the correlate of the expositor-pole. After all, a learned professor receiving instruction from a street urchin how to find his way back to his hotel, is for the time being a pupil.

Our first business in preparing this ordinary term *pupil* for our use is to get rid of the lingering notion that it represents a purely passive side of the process of learning. It connotes rather that the person is being directed in his activities than that he ceases to be active. We are prone to regard listening as in itself a passive matter. The audience is conspicuously passive while the lecturer or preacher is as conspicuously active. Preaching has in fact been defined as "an animated dialogue with one part left out." But this part that is left out as spoken word must certainly be supplied as inner thought all through the sermon: else the preaching is a complete failure. The difference between teaching and lecturing lies just here. No fault is more common among inexperienced teachers

than the tendency to do all the talking, and to treat the pupils as mere sleeping partners in the work of the class. "Too much of a lecture" is the hardest-worked *cliché* in the Normal Master's repertory of critical phrases.[1] In class-work the "one part" must not be left out. There must be give and take; the pupils must be allowed not only to be active but to show their activity. In Exposition the teacher may work either by the way of open dialectic, the rapid interchange of question and answer, or by the more deliberate methods of the lecture. The important point to note is that the pupil must be equally active in either case. The psychology of listening has not been sufficiently considered by teachers.

To begin with, we are inclined to regard listening as more continuous than it really is. Psychologists are laying more and more stress on the rhythmic element in the phenomena in which they are interested. Nowhere is this rhythmic element more prominent than in listening, especially when long periods are considered. Trained listeners, such as students who have reached the post-graduate stage, are able to listen with a fair degree of continuity throughout an hour's discourse; but your ordinary amateur listener, say the man who confines himself to a sermon a week and an occasional popular lecture, hears only in patches.

[1] It is interesting to note that the inevitable reaction has come. So thoroughly have students in training been drilled into a distrust of lecturing that they are now said to be losing the power of sustained speech. "Few of our recently trained teachers," says Professor Mark Wright, "can make a well-arranged verbal presentation to a class for ten minutes, without asking questions." It would certainly be a pity if teachers lost the power of consecutive presentation, but, of the two, the loss of this power of lecturing would be much less serious than the loss of the power of conducting class-work on the lines of a vigorous dialectic.

Salient points in the discourse stand out, but each of these is a point of departure for trains of thought not bargained for by the speaker. The untrained listener rushes off from each salient point—and often from points that are not at all salient from the speaker's point of view—in a direction determined by the acquired content of his own mind, and he is recalled only by the emergence of another point in the lecture that catches his wandering attention.

Fortunately what is true in interstitial vision is true here. Just as the mind fills in a great many of the gaps that occur in actual vision, so it fills in a great many gaps that occur in the hearing of a discourse. Even dull people who are in earnest about the sermon go away with some fairly complete general idea of the whole (it is taken for granted that there is a general idea underlying the whole); but in many cases, no doubt, even after honest attention, the inexperienced listener goes away with only one or two prominent points, which are not by any means necessarily points in the main line of thought, but are more likely to be prominent points of illustration.

A training in the art of listening is therefore an important part of Exposition. Unless the expositor can assure himself that his pupils are doing their share of the work, he must be very doubtful about his success. In class-teaching he will of course seize every opportunity of making the pupils take an overt share in the work; but in the case of a more or less formal lecture this is difficult, sometimes indeed impossible, and the lecturer must do what he can to encourage the pupils to test their powers of continuous attention. An excellent test that they can themselves apply

is to see how far they can anticipate what is coming. Certain lecturers resent such a test. I have known one quite lose his temper when this matter was brought before him. He did not put it that way, but his view obviously was that nobody could anticipate what *he* was going to say in any of his lectures. But the test implies no challenge of the lecturer's originality. No doubt at the very beginning of an isolated lecture by an unknown person, one cannot usually anticipate what is coming, and, further, at many points in a lecture one may be quite unable to guess what is coming next. But in an ordinary lecture or sermon the experienced listener is generally able to anticipate a great deal of what is coming. When a halting speaker hesitates for a word, there are usually scores of his hearers who have already supplied it.

What the psychologist points out to us in our ordinary reading of a book or newspaper is true in our listening. In almost every case the incidence of attention is not on the word that occupies the centre of the field of vision.[1] So in music we are familiar with the fact that the performer's eye is frequently bars ahead of the note he is actually striking, and in certain familiar combinations the conclusion of a passage seems to come of its own accord, even when the notes are not seen at all; that is to say, certain common endings will be played quite naturally by the performer even if the notes occur on the page that has not yet been exposed. We are too apt to assume that our reading and our listening are matters of word by word

[1] Dealing with reading aloud, Mr. E. V. Lucas, in *The Author* for July 1909, writes the suggestive words: "Lacking the needful power of seeing two lines ahead (as John Roberts used to see two cannons ahead), I am continually falling into wrong stresses and misunderstandings, which annoy me like little stings."

understanding. Our thinking is not carried on in this atomistic way. We work with much bigger units than the individual word or sound. We can never know the present except in relation to the past and the future. In the stream of thoughts that pass through our minds the present thought is the darkest in the whole series:

> The knowledge of some other part of the stream, past or future, near or remote, is always mixed in with our knowledge of the present thing.[1]

When Shakespeare and Shelley agree in selecting as man's high prerogative the power of "looking before and after," they are building on a sound psychological foundation. The present can be understood only by reference to the past and the future.

In listening, the pupil should always be using the past to anticipate the future. The beginning and ending of good listening is anticipation—being able to project ourselves towards the point up to which the lecturer is leading. We may not be able to anticipate the lecturer sentence by sentence. It may be that we are unable to complete such a sentence as "The most optimistic writer on Education is—" Here it is probable that very few could add the missing word in the sentence as it thus comes out of the blue. But suppose this sentence occurs in the middle of a lecture, a good lecture—that is, a lecture that has been thought out and organised—there would have been in all probability indications by the help of which an experienced listener could infer at least the category under which the individual name is to be found. So far from being a reflection on the lecturer's originality, it is the highest compliment to him that his audience

[1] W. James, *Principles of Psychology*, vol. i. p. 606.

should be able to anticipate, within limits, what is coming. It is your careless, unprepared, unmethodical man who says the unexpected things. For remember, even with a professional dealer in paradoxes, it is quite possible by the rule of contraries, or in extreme cases, when that rule fails, by the rule of contra-contraries, to anticipate what he is going to say. In other words, an organised lecture has a style underlying it that is all in the whole and all in every part, and that style can be surprised by a sympathetic listener. A merely capricious lecture, on the other hand, has nothing by which its development may be followed.

Note further that the essential thing is not so much that the pupil is to be able to anticipate the very points to be raised, and how they will be settled, as that he must adopt the anticipative attitude. The pupil-mind must be feeling its own way into the problems that are being dealt with, and must keep on asking itself questions about the possibilities of the case. It may be thought that this stretching out of the mind towards what is to come will render it oblivious to what has gone before, that it will be so busy with the future as to lose sight of the past. On the contrary, it is only by relying upon the past that the mind has any chance of anticipating the future. The really active mind is playing all round the subject it is examining, and from what has been already presented, it gets all manner of impulses urging it to make tentative advances in this direction and in that. Each advance is not only suggested by what has gone before, but must be tested by its consistency with the facts that have suggested it.

Assuming that the ultimate purpose of Exposition is to cause to arise in the mind of the pupil a

combination of ideas exactly corresponding to a combination already formed in the mind of the expositor, it is clearly of the first importance to find out what means are at our disposal to bring about this combination in the pupil's mind. This demands a study of the nature of ideas and the laws according to which they act. But before entering upon details it is well to get a general view of the whole ground. In ordinary language we use the word Illustration as meaning the clearing up of something that is in itself obscure. This idea we found to underlie also the meaning of Exposition. In point of fact, there is a certain confusion in the popular use of these two terms, a confusion that has a good deal to justify it in the usage of capable writers. Appealing, as in the case of the term Exposition, to the disinterested verdict of the dictionary, and, in order to widen our outlook, selecting a different lexicographer, we find that Webster thus delivers himself on the meanings of the verb *to illustrate*:

1. To make clear, bright, or luminous.
2. To set in a clear light; to exhibit distinctly or conspicuously.
3. To make clear, intelligible, or apprehensible; to elucidate, explain, or exemplify, as by means of figures, comparisons, and examples.
4. To adorn with pictures, as a book or subject; to elucidate with pictures, as a history or a romance.
5. To give renown or honour to; to make illustrious; to glorify.

The first meaning is purely literal, as shown in the line quoted from Chapman: "Here when the moon illustrates all the sky," and does not interest us here.

The fifth meaning is also foreign to our present purpose, and besides is obsolete. The fourth meaning embodies only a special form of illustration. But when we deal with the second and third meanings, we come to close quarters with the distinction between Exposition and Illustration. It is quite obvious that if we set something in a clear light or exhibit it distinctly or conspicuously, we are really doing what we have included under the head of demonstration when treating of Exposition. In the third meaning the overlap between the two processes becomes particularly noticeable. The purpose of Exposition is just to make things clear, intelligible, or apprehensible; but the *differentia* may be found in the second part "to elucidate, explain, or exemplify, *as by means of figures, comparisons, and examples.*" Here we are led to see that Illustration is to be regarded as a branch of Exposition. A mere setting forth of principles may be fairly called Exposition, but could not be justly called Illustration; it is only when we proceed to supply examples, and to institute comparisons, or in some other way to elaborate our presentation, that we can be said to illustrate.

The secondary meaning, then, of Illustration as found in the dictionary, but the primary meaning for our purposes, may be said to be the process of throwing light upon something that is assumed to be already known in a vague and more or less unsatisfactory way. There is always a principle or body of principles that may be regarded as given (though not perhaps necessarily given to the pupil at the beginning of the illustrative process), and as thus forming the datum of the problem of Illustration. This I should like the reader to permit me to call the *illustrandum*, as a parallel technical term to the

expositandum. One part of the function of Exposition, we have seen, is to present new matter; and another is the manipulation of matter that has been already presented. One is tempted to limit Exposition to the first function, and to hand over all the rest to Illustration. Anything that we do or say to introduce a different arrangement of ideas already in the mind of the pupil would, on this view, be properly called Illustration. We are not to lose sight of the fact that Illustration is a branch of Exposition, and must not be surprised to find a certain overlapping in respect of the matters treated. In point of fact, both processes deal with both the new and the old. Yet there is a difference in their use of the two kinds of materials. The new ideas introduced by Exposition form an essential part of the subject-matter that is under discussion, while the new matter introduced by way of illustration may have only a secondary connection with the subject-matter. An illustration may introduce new ideas, but these are not in this connection treated as of importance in themselves, but only as throwing light upon the ideas that are at the time being expounded. When Mill states in his second canon:

> If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former; the circumstance in which alone the two instances differ is the effect, or the cause, or an indispensable part of the cause, of the phenomenon—

he is expounding; but he proceeds to illustrate when he goes on to say:

> If A B C, A D E, A F G are all equally followed by *a*, then *a* is an invariable consequent of A. If *a b c*, *a d e*, *a f g* all number A among their antecedents, then A is connected as an antecedent by some invariable law with *a*.[1]

[1] *Logic*, Book III. chap. viii.

So far Mill can hardly be said to have introduced any new ideas by way of illustration. The letters are mere pegs ready to hang matter on when it is presented. When in the following chapter of his *Logic* he introduces a discussion of how "arsenious acid and the salts of lead, bismuth, copper, and mercury" act as poisons, he is still illustrating the canon, but he is introducing a whole series of entirely fresh ideas that have no connection in themselves with the subject-matter under consideration, which is the logic of experimental method. In point of fact, he assumes that his readers know enough about chemistry to follow easily his references to Baron Liebig's theories. As a general rule it is unwise to use as illustrative material something that is very unfamiliar to the pupil. It is seldom good policy to use many new ideas in an illustration. In certain cases it may be justifiable to "work up" an elaborate illustration out of new materials. But this is permissible only when it is possible to group into one mass a number of facts that are useful not merely as illustrative of certain points, but as themselves important elements in the organised whole that makes up the subject under consideration. Illustration will thus be seen to be, on the whole, rather a work of arrangement than of addition.

All the same, it is clear that illustrations of the nature of those submitted by Mill from Baron Liebig cannot but convey in passing a certain amount of new information. Not only do they make clearer and more definite the points that they illustrate, but they increase the mental content of the pupil. He may not know the principle of the lever any more accurately after a long series of illustrative examples, for it is quite possible to understand the principle from only one example, but

he will understand it in a broader way. His experience has been enriched by the number of cases in which he has seen the principle exemplified. He does not know it more accurately, but he knows it more usefully.

Hitherto we have been considering Illustration merely from the cognitive side, as a means to enable the pupil to understand something that is difficult. But our object is not always to make another understand something. It may be to make him realise more vividly, to appreciate, to enjoy. We must therefore make provision for the æsthetic use of illustration. The importance of this aspect must not be underestimated. An old clergyman, addressing an audience of beginners in his own profession, told them that they might preach over and over the same sermon at reasonable intervals, if only they took the precaution to change the text, *and the illustrations.*[1] The congregation will remember the illustrations long after the expositions, the descriptions, and the exhortations have been comfortably forgotten. Herein lies one of the chief dangers in the use of illustration. There is a strong temptation to use it for the sake of its own intrinsic interest, instead of for the interest it arouses in connection with the subject under discussion. Unless an illustration forms part of the very nature of a lesson; unless it is worked into the very warp and woof of the whole, it is illegitimate.[2] An illustration must not be used

[1] It is worth noting that young clergymen have complained that this gracious permission to use old sermons is no great relief. After all, they say, it is the illustrations that count, and if one has to work them up into the very warp and woof of the sermon, this practically means that the sermon has to be re-written.

[2] People who make a study of the art of advertising take the view that the main purpose of illustration in a newspaper or on a poster is to attract attention. The drawing may be bad; it may

as a sedative. Its function is to stimulate. The teacher may think that he is entitled to introduce a story to brighten up a dull lesson; but he can purchase this privilege only by inventing a connection between the story and the lesson he is teaching. Some of our old English essayists supply capital examples of this justifiable combination of the didactic and æsthetic functions of Illustration. Thomas Fuller, for instance, makes a very systematic application of this form. He has a habit of marking off his essays into short paragraphs, each beginning with an easily understood generalisation immediately followed by one or more illustrations that give it point. Thus in his essay "Of Memory" we have the fourth paragraph running:

> Overburthen not thy memory to make of so faithful a servant a slave. Remember Atlas was weary. Have as much reason as a camel, to rise when thou hast thy full load. Memory, like a purse, if it be over full that it cannot shut, all will drop out of it. Take heed of the gluttonous curiosity to feed on many things, lest the greediness of the appetite of thy memory spoil the digestion thereof. Beza's case was peculiar and memorable: being above fourscore years of age, he perfectly could say by heart any Greek chapter in St. Paul's Epistles, or anything else which he had learned long before, but forgot whatsoever was newly told him; his memory, like an inn, retaining old guests, but having no room to entertain new.

This use of illustration, common in Bacon, and in a less condensed form in modern essayists, is valuable in sermons and hortatory addresses, but must be used sparingly in lectures, and more sparingly still in lessons.

not accurately represent the object advertised, but if it catches the attention of the passer-by or the indifferent newspaper-reader, it has served its purpose: "Charles Austin Bates, the most successful advertisement designer of the day, has repeatedly asserted that the function of the illustrator is to attract attention, and not necessarily to illustrate." *Illustrated Advertising*, by F. W. Johnston, ninth edition, Toronto, 1901 (Introduction).

Essayists who follow more or less the method of Fuller are read largely for the interest of the illustrations. But, after all, the best essayists do make their generalisations the important points. All the rest of the matter centres round them. The illustrations may not be necessary to make clear the actual meaning of the thesis, but they at least illustrate. They form an organic part of the whole; they are not dragged in merely for the sake of their intrinsic interest. In a well-organised lecture or lesson it is possible that the illustrations may occupy more space than the statements to be illustrated; but the main statements are felt to be the essential matters, the illustrations, however numerous, are organically interstitial. On the other hand, there are lectures and lessons, and even books, in which the illustrations are the main element, and the rest of the matter is worked in around them. The generalisations are interstitial. The substantive matter is made up of what are nominally illustrations. Lectures on "The Humour of Mark Twain," on "The Blunders of School Children," on "The Ballads of Scotland," are all very likely to turn out to be series of illustrations with a few strenuously invented generalisations keeping them apart. The most popular form of book review is made up mainly of interstitial matter, and lantern lectures have an almost irresistible tendency to resolve themselves into interstitial commonplaces that only a good set of slides can condone in the judgment of an intelligent audience.

Some teachers may reasonably interpose here, and maintain that lantern lectures ought to be interstitial. There is a great deal to be said in favour of such a view. But to adopt it would be

to change the standpoint from which we have been considering the whole matter. It is quite reasonable to maintain that the most valuable part of a lantern lecture is not what the lecturer says, but what his slides show. Still, if the information conveyed by the slides is regarded as a primary matter, they can no longer be treated as illustrations; they have become the substantive matter of teaching. The interstitial remarks of the lecturer are really illustrative of the slides. In the case of a literary lecture professing to give a critical estimate of a writer's works, it is illegitimate to depend for the main interest of the lecture on the intrinsic attraction of the quotations. The interest should be in the relation the lecturer is able to establish between his generalisations and the particular quotations that he uses to support his views. "Note the beauty of this passage"; "What could be more inspiring than the following"; "If you wish to know what pathos means, turn with me to the Ode to——"; "No one with a spark of humour in his composition could refrain from chortling over the exquisite passage I am about to read to you." All these are mere bits of padding that mark what may be called finger-post criticism. On the other hand, some of the finest passages of Shakespeare may be read with almost no interest in their primary meaning because they are being used to illustrate a point in the Shakespeare-Bacon controversy. It is quite possible for a lantern lecture to depend on the actual lecture that is delivered, so that the hearers recognise that the slides, however good they may be, would either have been meaningless without the lecturer's exposition, or would have had quite a different meaning from that they actually took under his manipulation.

It is clearly important for the teacher to distinguish between the values of certain materials as illustrations on the one hand, and as the subject of actual teaching on the other. Finger-post criticism has its place in school. Indeed it is probable that some readers of this chapter have got rather angry at the idea of spoiling Shakespeare by using his writings merely to illustrate an argument. But for our professional purposes it is important to keep apart the two uses of subject-matter, the one as illustration, the other as substantive matter of instruction. It is an excellent thing to read to a class a series of extracts from a standard author with only a few explanatory comments—probably a better thing for the class than to give it a seriously worked-out lecture in which only illustrative extracts are given. We have to remember that the purpose in the two cases is different. In the first case we are giving the pupil the actual material; in the second, we are entitled to assume that the pupil has the material, and all that we have to do is to manipulate that material in such a way as to enable him to acquire a better mastery of what he already possesses. Under ideal conditions, in a lecture on the Humour of Tom Hood, it may be assumed that the audience have all read Hood's works at least once. The lecturer has therefore no need to fall back on mere finger-post criticism; and, on the other hand, he has no temptation to rely upon the intrinsic interest of the passages he quotes. In practice, however, it is impossible to attain the ideal, so the teacher has to combine in the most effective way he can the two uses of his material. In a lesson intended to deal with literature as subject-matter the teacher should seek to make himself as little prominent

as possible. The matter is the important thing. So long as lantern slides are used as teaching matter (*docendum*), the pupils are entitled to attend to the teacher's explanations only so far as they feel the need of them. When the slides are used as illustrations, the incidence of attention should be reversed.

The subject-matter of teaching-illustrations is of considerable importance. In certain branches no problem emerges. Only one kind of illustration is possible, and the choice of the best material in that kind is really an essential part of the specialist's knowledge of how to teach his subject. But in many subjects illustrations may be sought from all parts of the field of knowledge, and the question arises whether it is better to select illustrations from matter that is cognate with that under discussion by the pupils dealt with, or to choose matter as different from that as possible. Generally speaking, it is better to keep to cognate subjects, as in this way the teacher may be teaching one branch substantively while illustrating another. On the other hand, there is the danger of weariness if the pupils are never allowed a change of venue. Teachers are beginning to realise, what pupils have realised some time ago, that it is possible to carry the method of correlation to such an extent as to exhaust all possible interest in certain matters. Illustrating in a circle is not quite so deadly as reasoning in a circle, but it has its serious defects.

From what has gone before, it might appear to follow that in using Illustration we must always adopt the deductive method. The illustrandum is given as a sort of general statement, which the rest of the process works out and applies as in ordinary deduction. But Illustration may some-

times be used in what may be fairly called an inductive way. Indeed, the methods used in applying Illustration vary between two extremes. At the one end is the plan of depending mainly upon Exposition. Everything is stated in the plainest possible terms, and illustrations are introduced only where absolutely necessary, and are always stated to be illustrations. They are formally introduced by *as* or some such word, or are actually named illustration or example. This all fits in with the deductive notion. At the other extreme are found those cases where the illustration is given almost without comment, and its meaning left to be inferred. Especially when many illustrations are given and the pupil is led to draw certain inevitable conclusions, the resemblance to induction is so great that the reader may not unnaturally say that it is induction and nothing else. The genders of Latin nouns as gathered from inspection of their mere form may be inculcated by a series of exercises to our pupils in which certain typical Latin nouns are systematically called into play without any overt reference to their gender. But some may be inclined to question whether this is really Illustration. Is it not a process in which we teach rather than merely illustrate? It is true that the illustrandum does not appear till the process is completed, but it has been in the teacher's mind throughout. It may not therefore be altogether unreasonable to regard the process as one of Illustration, the teacher adopting the deductive attitude, and passing from the generalisation to the particulars, and the pupils reversing this order. This view is worth elaborating a little, as it is not quite in harmony with the usual nomenclature.

Sometimes in ordinary experience light is thrown

upon some matter that nevertheless cannot be called the illustrandum, since at the beginning it is not present as such in the mind of either the pupil or the teacher. A person who knew no German was called upon to make a vocabulary that included over two thousand German nouns. She had to indicate in each case the gender, the genitive, and the meaning of the noun. Her method was the straightforward one of looking up each word in a standard German dictionary, and copying out the relevant details. As the work progressed, she found that she could anticipate with increasing accuracy the gender and genitive of each new noun as it presented itself; till towards the end she was strongly tempted to depend upon her general impression, without troubling to verify it by reference to the dictionary.

A still more striking case is one that occurred under the deplorably bad system of payment by results, in which the teacher's professional reputation depended upon the percentage of pupils he could contrive to squeeze through certain individual examination tests. A harassed teacher who had not enough time to attend to the dullards that under this system were the persons of chief importance, tried to get rid of the troublesome clever pupils in her youngest class by keeping them busy with long addition sums, while she devoted all her energy to getting her dullards to work little sums with sufficient accuracy to obtain the coveted pass. Through much practice, the clever pupils were able to work the long sums so rapidly that they were continually worrying the poor teacher by coming back for more. To save time in giving out fresh sums, she dictated only one line, say 987,526, and told the pupils to repeat that line on their slates

other eight times, making nine lines in all, and then add the whole. The remarkable thing was that after some weeks of this ingenious labour-saving device, the poor teacher was more harassed than ever. The pupils appeared to have acquired a positively uncanny speed in addition. On investigation it was found that the children had gradually noticed that there was something peculiarly symmetrical about the new sums the teacher was giving them. Some of the more intelligent among them began to see that it was a pity to waste time adding up a column of nine eights when they had added up such a column a little while ago. They began therefore to keep a note of results for future use, and gradually gave up adding at all, except in the matter of carrying from one column to another. The step from this to pure multiplication was easy, but as a matter of fact was not made by the pupils themselves; the secret of multiplication was communicated to them (for a consideration) by certain pupils in higher classes to whom the young experimenters had been talking about the peculiar sums they had lately been having. The net result was that those pupils learnt in a few weeks, and with great satisfaction, the full meaning of the multiplication table and its application; matters that under ordinary circumstances take a whole school year to master.

It might be argued that in these cases the pupil passed from the illustration to the illustrandum. But this is an unnecessary strain on the terms. It is better to restrict the term Illustration to those cases in which there is a deliberate attempt to throw light upon a given subject. Here, to be sure, light was thrown upon certain matters, but without any deliberate intention on the part of either teacher

or pupil. The learning, in fact, was carried on in the ordinary inductive way.

The case is somewhat different when the teacher makes a deliberate use of the illustration before presenting the illustrandum. He is often able to arrange matters so that certain experiences of school difficulties that must occur at any rate among his pupils shall occur at certain stages that are convenient for him. He can, in short, modify the order of the development of the pupil's mental experience in such a way that the elements of this experience shall form certain combinations that from the point of view of the school are valuable because they lead to the pupil's coming to certain desired conclusions. To put it somewhat less abstractly, it is quite possible for a master who has taught the same school grade for several years to know very exactly how certain of the special points to be dealt with in that grade will affect certain minds. He is therefore in a position to arrange the matters to be presented in the order he thinks will best aid their proper assimilation. For example, the construction of the accusative with the infinitive in Latin involves problems for the young mind that are insoluble at certain stages of knowledge. This subject may be illustrated in advance by a carefully arranged series of lessons that have no apparent connection with the *oratio obliqua*, as found in Latin. English grammar may be so taught as to pave the way, and even the use of brackets in Algebra may be regarded as a preparation—as may be seen in the interesting little monograph on the subject by Rev. J. H. Raven.[1]

[1] "Do the two accusatives both feel the influence of the Transitive *dicit*, and so form a complex noun, governed by *dicit*, so that the analysis will be: *He mentions the-enemy's-coming*? Key (*Lat.*

In the ordinary sense of the term an illustration is expected to accompany the subject-matter to be illustrated, so it must be admitted to be a little strain on the term to call such processes as those we have just dealt with Anticipatory Illustration. To be sure, the teacher always has the illustrandum before him as he prepares the exercises that are to throw light upon difficulties that have not yet arisen in the pupil's mind, and this gives a certain amount of justification for the introduction of the term "Anticipatory Illustration." But the real reason for seeking to use the phrase is that there is need for some term to designate a process whose importance is beginning now to be appreciated. Using Anticipatory Illustration in such a way that pupils must reach certain generalisations, may be regarded as a form of inductive teaching. The pupil may be so fed with illustrative matter that he is practically coerced into reaching certain conclusions. The heuristic method, in its healthier forms, is nothing more than a system of Anticipatory Illustration inevitably leading to a conclusion that already exists in the teacher's mind. It is a caricature of the method to describe it as a process of placing the pupils in the position of the original discoverer of a certain truth, and keeping them there till they discover it for themselves. We cannot put pupils in the position of the original discoverer. We can turn them loose in an orchard

Gram. § 911) seems to take a somewhat similar view to this. In analysing *Ferunt Caesarem rediisse*, he has this original note : 'A mathematician might have expressed this by—*Ferunt* (*Caesar rediit*)*em*, attaching the symbol of the accusative case to the clause. As the Romans were afraid to do this, adopting what under the circumstances was perhaps the best makeshift, they selected for the addition of the suffix the chief substantive.' " *Latin Exercises in the Oratio Obliqua*, by the Rev. J. H. Raven, p. 55.

and let them watch the apples falling; but it would be difficult to say how much time we should give them before we come back to find them in possession of the theory of gravitation. The teacher on the heuristic method never lets go the guiding reins. He may hold them now loose and now tight, but he never drops them. He knows the course and he keeps his pupils in it—with the minimum amount of restraint, it is true, but the restraint is none the less real. It is throughout a system of Anticipatory Illustration.

It is sometimes maintained that the heuristic method gives no real training in induction, since all the matter is so carefully arranged beforehand that the mind is not left free. But the mind, as a matter of fact, is under no circumstances ever left free. It must react upon what is presented to it, and it acts in the same way upon the material presented whether that comes at haphazard or is carefully arranged in a definite order. The induction a pupil makes as the result of considering a number of Anticipatory Illustrations is as genuine as one that he makes in his ordinary experience. The fact that his ordinary induction is so often wrong because the matter is not presented in a helpful order is surely no advantage. So far as the process is concerned, there is no difference in the two cases. An induction either is an induction or it is not.

A more plausible objection is that Anticipatory Illustration may be so arranged as to prevent the possibility of error, and thus deprive the pupil of that practice in dealing with deceptive cases that is so necessary as a preparation for the work of life. But here it is only necessary to remark that in spite of the teacher's best endeavours he will find it almost

impossible to arrange his Anticipatory Illustrations so that there is no loophole for error. Further, at later stages the pupil is left more and more to his own resources. Under any system inductions must be verified, and this verification may be as well taught in connection with the heuristic method as with any other.

As an example of the application of Anticipatory Illustration with the minimum possibility of error, take the case of teaching Euler's Theorem, that gives the formulæ for the number of faces, corners, and edges of a pyramid or prism having a given geometrical figure as base. The data of the theorem may be so presented that the pupils must discover it for themselves. They are assumed to know what is meant by a face, a corner, and an edge. The teacher supplies the pupils with the sixteen solids named in the following table, but the numbers as they appear on the printed table are not inserted :—

EULER'S THEOREM

Pyramids.			Name of Solid.	Prisms.		
Faces.	Corners.	Edges.		Faces.	Corners.	Edges.
4	4	6	Triangular .	5	6	9
5	5	8	Square . .	6	8	12
6	6	10	Pentagonal .	7	10	15
7	7	12	Hexagonal .	8	12	18
8	8	14	Heptagonal .	9	14	21
9	9	16	Octagonal .	10	16	24
10	10	18	Nonagonal .	11	18	27
11	11	20	Decagonal .	12	20	30
$n+1$	$n+1$	$2n$	n-gonal	$n+2$	$2n$	$3n$

Provided with this blank table and the necessary solids, the pupil is called upon to fill in the required

numbers by the simple process of counting from the actual solids the number of faces, corners, and edges. All he is asked to do is to fill up the table as far as the decagonal solids. Naturally the generalised expressions in terms of n that occur at the end of the table are not even suggested to the pupil. It is the purpose of the lesson to lead the pupils to reach the generalisations in n for themselves. To enunciate these at the beginning of the lesson would be what Professor Henry E. Armstrong calls "criminal."[1]

At first the pupils fill up the table in that conscientiously indifferent way that children have of dealing with easy routine exercises. By and by they begin to note a certain symmetry, and their intellectual interest is aroused. It is an excellent plan to omit two of the figures, say the octagonal pyramid and the nonagonal prism, and invite the pupils to fill up the corresponding spaces by calculation. It will be found that fully half of the class will be able to do this directly they come to the place of the missing figure, and almost all the rest of the class will be able to fill in the blanks after they have completed all the entries so far as they have solid figures to count from.

The second stage consists in requiring the pupils to continue the table, filling in the non-technical terms in the name column—11-gonal, 12-gonal, 13-gonal, and so forth down to 20-gonal. Experiment showed that almost every pupil in a class of sixty boys of ten years of age could complete the table up to 20, and all this without one single word of explanation from the time the first figure was set down till the 60 edges of the 20-gonal prism were recorded.

Keeping to the case of the class just mentioned,

[1] *The Teaching of Scientific Method*, p. 254.

the third stage consisted in setting the pupils to fill up the figures for a 40-gonal figure, then for a 60-gonal, then for a 100-gonal solid. Here there was a bigger percentage of breakdowns, and the method adopted was to write the correct line of figures on the blackboard after each solid had been attempted. In this way those who failed in the 40 solid saw how things went, and generally succeeded with the 60 or the 100 solid.

The fourth stage consisted in a series of exercises such as: How many edges has a 45-gonal pyramid? a 45-gonal prism? How many corners has a 72-gonal prism? The correct answer was in each case placed upon the board, and the pupils were thus enabled to correct any miscalculation.

The fifth stage consisted in exercises that worked backwards: A ?-gonal solid pyramid has 41 corners, how many faces has it? How many edges? What -gonal is it? (That is, what number should go before the *-gonal* in the name column?)

The final stage consisted in an invitation to fill up the *n*-gonal figures. All that was explained was that *n* stood for any number, and that what was to be noted was whether the different numbers would be greater or less than *n* and by how much. At the first exercise 35 boys wrote down the correct generalised form. They had won their generalisation.

CHAPTER II

MENTAL CONTENT

TEACHERS are now familiar with the phenomena of apperception. At the earliest stages pure sensation is possible to the developing human being, but very soon sensations are associated with meaning, and become perceptions. Thereafter every stimulus that the mind has to deal with is modified by the results of previous stimulations. When we reach the plane of ideas it is found that while every new idea presented is acted upon in accordance with the laws of mind, these laws can only be applied as conditioned by the other ideas at that time possessed by the mind. In other words, each new idea is acted upon by all the other ideas at that time available in the mind in question. This process is known as apperception. A given mind possessed of certain ideas must react in a determinate way when a given new idea is presented to it. Any one, therefore, who knows the general laws of mental activity and the content of a given mind, may act upon that mind with a fair chance of being able to produce a desired mental result. In point of fact this is what the expositor does, for Exposition may be regarded as the process of guiding and directing apperception in another mind.

The first assumption, then, underlying the art of Exposition is that it is possible for one mind to act upon another. Successful exposition implies that one mind has been able to produce a predetermined effect upon another. Now while our ordinary experience leads us to believe that this interaction between minds is continually going on, the slightest dip beneath the surface shows us that the matter is not nearly so simple as it appears. There is no direct communication between minds. Mind understands mind only by an elaborate system of interpretation. Philosophers puzzle themselves and their readers over the problem of the relation between the individual consciousness and what they call the general consciousness. But whatever this relation may be, it is one that does not admit of articulate expression. For all practical purposes each individual consciousness is insulated from every other. Consciousness is as impenetrable as matter; by no possibility can we penetrate into the consciousness of another. What goes on in that other consciousness can be understood by us only as the result of a process of inference from our own experience. The everyday act of influencing the mind of another, therefore, acquires all the interest of a mystery.

We may never be able to explain fully all that underlies this mystery, but we can at least lay down certain conditions that must be complied with if we are to succeed in producing upon the mind of another a predetermined effect. To begin with, we must be able to catch and retain the attention of the pupil. Next we have to acquire the power of manipulating his mental content so that there shall arise in his mind a combination of elements similar to a certain combination already existing in our own mind. To do this we must

have a knowledge of the mental content of the pupil. The next condition of successful exposition is a knowledge of the laws according to which mind in general acts. No doubt there are great varieties in the detailed working of individual minds, but there are certain laws, which are of a very general character, it is true, but which within the wide limits of their application are absolute. We cannot break these laws even if we try; it is according to these laws that the mind always reacts upon material presented to it. They are generally known as the Laws of Thought as Thought, and are more frequently found in books on logic than in books on psychology. So exceedingly general are they, that when they are stated they sound particularly empty. But it has to be remembered that their emptiness is the result of their universality. They run as follows. The first, known as the Law of Identity, is represented by the enlightening formula *A is A*. This again is explained to mean that everything is equal to itself, or the whole is equal to the sum of the parts. It has to be noted that this statement has nothing to do with either the whole or the parts, except in their relations *as* whole and parts. It is found to be an imperative law of our thinking that we shall under no circumstances whatever conceive the whole as being either more or less than the sum of the parts. Of the many meanings that have been given to the Principle of Identity perhaps the one most in point here is that supported by F. H. Bradley. This is, that under identical circumstances the mind must reaffirm what it has once affirmed. For example, if I have once truly said that the sky is blue, I am bound to maintain the affirmation even though the sky as a matter of fact is blue no longer.

> Once true, always true; once false, always false. Truth is not only independent of me, but it does not depend upon change and chance. No alteration in space or time, no possible difference of any event or context, can make truth falsehood. If that which I say is really true, then it stands for ever.[1]

The Law of Non-Contradiction is the second of these momentous laws. This is expressed in the formula: What is contradictory is unthinkable. Its shortened form is A = not-A = O, or A – A = O. To take a concrete case, a watch cannot be both correct and incorrect at the same moment, and tested by the same standard. A person cannot be at the same time guilty and not guilty.

The third law introduces us to what is known as the Excluded Third, or the Excluded Middle. This compels us to think that of two repugnant notions that cannot both co-exist, one or the other does exist. "Of contradictory attributions we can only affirm one of a thing; and if one be explicitly affirmed, the other is implicitly denied. A *either is or is not.* A *either is or is not* B."[2] A centaur either is or is not. Socrates either is or is not guilty.

From our present point of view the fourth law is of less consequence than the others. It is known as the Law of Sufficient Reason, and limits itself to the assertion that we must infer nothing without a cause, or rather without a ground or reason, as *cause* is usually restricted to the region of the actual, and reason to that of thought. The very statement of this distinction is an explanation of the comparative unimportance of this law as illustrating the ultimate process of thought. The nature and origin of the idea of Causation has been elaborately discussed, and when so much can be said in favour of

[1] F. H. Bradley, *The Principles of Logic*, p. 133.
[2] Sir William Hamilton, *Lectures*, vol. iii. p. 83.

the Associational origin of the idea of Causation, it cannot be maintained that this law has the certainty that marks the others.

So unassailable are those three laws, that the general feeling of every one who hears them for the first time, is that they are superfluous, if not indeed a little silly. Why state them so ponderously when no one questions their truth? Are we any further forward when we have admitted that A is A, that A cannot be both A and not-A, that a thing must be either A or not-A? Yet it is because of our unanimity on these apparently unimportant points that we are able to reason with one another in the full assurance that we shall come to certain inevitable conclusions, if only the facts are stated aright. Two minds that are given the same facts cannot but come to the same conclusion. Depending upon these laws, we are able to rely upon producing by our exposition a definite calculable effect upon the minds of others. Given certain facts, we can prophesy the mind's reaction upon them.

Unfortunately the certainty of reaction is disturbed by the nature of the facts submitted to the mind. When dealing with quite abstract elements as in formal logic and pure mathematics the action of the mind can be depended upon. But unfortunately the greater part of our mental activity is carried on in connection with matters that are far from abstract. It is customary to use a figure of speech and speak, as we have done once or twice already, of *mental content*. Naturally, we must be on our guard against accepting this figure as expressing literal truth. The relation between the mind and mental content is not that between container and thing contained. For convenience of

expression we speak of the mind and the subject upon which the mind acts, but the two terms are often very loosely understood. Occasionally we think about this subject as something outside of us altogether. For example, the mind may be said to act upon the colours when we watch a sunset. If this be so, the mind is acting upon something that is material. But it would be better to say that the brain through the medium of the sense-organs is being affected in a certain way, and that as a result the mind is stirred to a particular kind of activity. The fundamental connection between mind and matter is fortunately no part of our present business; what we are interested in is the connection between the mind and that upon which the mind acts. Speaking generally, the mind is said to act upon *ideas*.[1] Mental content is usually regarded as being made up of ideas. It is a very convenient way of expressing ourselves to speak of the mind as a sort of force that acts upon certain entities called ideas. But ideas are not things from without that the mind takes into itself and builds up into useful combinations. Still less are they independent entities that act on their own initiative. Ideas are not so much things as forces. They are modes in which the mind manifests its activity. It is not so much that the mind has ideas as that the mind is ideas. It was formerly fashionable to speak of the mind as having a certain number of faculties; but recent writers regard the faculties as merely different ways in which the mind shows its activity: they are sometimes spoken of as modes of being conscious.[2] This description might be equally applied to ideas,

[1] Cf. Locke's definition of an idea as "whatsoever is the object of the understanding when a man thinks."

[2] Cf. Professor Stout, *Manual of Psychology*, Bk. I. chap. i.

the difference being that the ideas are modes of consciousness more specialised than are the faculties. My idea of a table is my mode of being conscious of tables, but it has its peculiarities. My experience of tables has not been exactly the same as everybody else's, and my mode of being conscious of a table is affected accordingly.

We must not be led into supposing that ideas always represent definite separate units such as we call things, or even that they always correspond to what are called the substantive elements of thought. It is found that the elements of thought may be roughly arranged into two classes, those upon which the mind may rest for at least a brief time, and those that are always on the wing and cannot be made by themselves the matter of thought, but must always be considered in relation to other thought-elements. The first class are called the substantive, the second the transitive elements. Naturally these terms are not to be confounded with their equivalents in grammar. For the purposes of Psychology, for example, a verb may be regarded as a substantive. The mind can rest on the idea implied in the verb *to walk*, but it cannot deal with such a word as *of* unless it gets the help of other ideas. The distinction between the substantive and transitive must not be pushed too far. We can in thought isolate transitive ideas and—with the help of other thought-elements—deal with them as substantives. Have we not erudite notes on such transitive elements as are indicated by μέν and δέ? There is, in fact, always a strong tendency to turn the transitive elements into substantive. We are disinclined to let an idea act merely as a force. We want to pause over it, and wherever possible analyse it. In actual experience, however, we frequently fail to

separate out the definite meaning of a word (which of course represents an idea), and yet we can use it quite accurately. We often find a difficulty in explaining the meaning of a peculiar turn in the mother-tongue. We know that the expression is correct, and that it is the only expression that will meet the case, and yet we cannot explain to the inquiring foreigner *why*. What is called the *Sprachgefühl* represents this general sense of the value of certain of the transitive elements of thought. We recognise them as forces though we are not always able to control them.

The uneasiness we experience in dealing with the transitive elements of thought results from a natural tendency we all have to endow abstractions with a more or less independent objective existence. There is in fact in the human mind a strong bias towards the "Thing" stage, and this bias must be allowed for in our efforts to convey thoughts from mind to mind. The fundamental tendency of the human mind to treat thoughts as things is illustrated in the universal bias towards personifying the forces of nature. Poets spend a good deal of their time in this process of giving to airy nothings a local habitation and a name. But hypostasis, as this tendency to reify thoughts is called, is apt to induce confusion. It leads us to imagine, for example, that because we can remember and imagine and judge, we must have faculties of memory, imagination, and judgment. A clock can tick, but no one thinks of endowing it with the faculty of tickibility. Yet if we had occasion to speak a great deal about a clock's power of ticking, we would almost certainly fall into speaking of its tickibility or its tickipacity. For expository purposes it is necessary to have a term to describe

the various modes of being conscious, and so long as we do not imagine that there is a *thing* corresponding to each of the terms no harm is done in speaking of the faculties of memory, imagination, judgment, and so forth.

It is obvious that there is the same tendency to hypostatise the ideas as there is to hypostatise the faculties. Indeed the two—the ideas and the faculties—have so much in common that they must be distinguished not so much by their fundamental nature as by their reference. While both are, as we have seen, essentially modes of being conscious, a difference between them may be said to be that while all men have the same faculties—though perhaps not of the same quality—all men are far from having the same ideas. The fact is that ideas are forces that have brought the mind into touch with something outside itself. They therefore either directly, or at one or more removes, have a real connection with the outer world. They are in consequence to some extent dependent upon the nature of the environment in which the mind functions. The same thing, however, may be said about the faculties. Memory differs greatly according to the class of facts upon which it is exercised. We may all be said to have good memories for something. So with imagination and even reasoning. We always reason more easily when dealing with matters with which we are familiar. This does not of course mean that the reason acts in one way in dealing with stocks and shares and in another in elaborating metaphysical theories. Similarly there are general laws according to which the consciousness acts in forming ideas, laws that are the same whether the idea has to do with the concrete or

the abstract. A convenient way of expressing the facts of the case is to say that some modes of being conscious are more general than others, and are called faculties; others less general and more affected by what they act on are called ideas. Since ideas are so much determined by our dealings with the external world, they may be said in some sort to represent the external world. This is how it comes about that ideas are often spoken of as if they were the material upon which the faculties act. We do not usually speak of the mind acting upon the imagination or the judgment—though by the way we sometimes hear expressions, among those who profess to improve the memory, that seem to imply an action of the mind on the memory—while we do speak of its acting upon ideas. It is in this sense that ideas may be called the content of the mind, since they provide a means by which the activities of the mind may be exercised. Memory, judgment, reasoning, and the other so-called faculties cannot exist unless they have something to exercise themselves upon. They cannot carry on their functions *in vacuo*. They depend upon the ideas to provide them with the necessary material to operate upon. This may be accepted as a useful form of stating the case, but it is necessary to be always on our guard against supposing that the ideas are in any real sense more material than the mind itself. They may be that upon the production and manipulation of which the activity of the mind expends itself, but it is only in this metaphorical sense that they can be regarded as material.

While we treat ideas as forces we are still in danger of hypostatisation. They are forces, no doubt, but not independent forces. We sometimes

speak of them in a vague way as acting upon the mind. But this is always a mistake. They never act upon the mind, for the reason that they themselves are only modes in which the mind acts. It has been suggested that an explanation may be effected by regarding the ideas as one part of the mind acting upon another part. To this no objection need be raised so long as it is clearly recognised that the normal healthy mind is after all one and indivisible. From its very nature as an organism the mind must have action and reaction going on within itself, but it must never be forgotten that it always remains one organic whole. Ideas are really more or less stereotyped modes of being conscious resulting from the more or less constant reaction to the same sort of conditions. A set of conditions that is continually recurring in absolutely the same way naturally causes a very definite reaction.[1] This gives rise to what may be called an idea of great force, say the idea of food. We can think of this idea and speak about it without actually believing that there is an idea of food apart from any mind. When we say that the idea of food produces a certain effect on the mind, what we really mean is that the mind as a whole is experiencing a reaction resulting from its own activity in a certain direction. When several ideas, say food, hunger, poverty, are said to act upon each other, what is meant is that the mind is correlating its various activities in relation to conditions that lie outside of itself.

As a matter of phrasing, therefore, it may be

[1] A skilled mechanic's idea of a hammer is quite different from that of, say, a writer of novels. Foremen in works tell us that they know the really skilled workman by the way he lifts a hammer. His reaction is quite different from that of the casual user of the implement.

permissible occasionally to speak of ideas as forces acting and reacting upon each other. But it has always to be kept in view that this is only a mode of expression, a convenient figure of speech, and that the mind is the sole source of the activity of the ideas.

From what has been said, it follows that ideas are of different degrees of remoteness from the outer world. Certain ideas can be got directly from without and in no other way. The only way to attain to an idea of the scent called *Eau de Cologne* is to experience the sensation caused by smelling it. But the idea of scent as such is formed within. From without we can get such ideas as red, blue, yellow, and green; but we must look within for the idea of colour.[1] Exposition is quite unable to make a congenitally blind person realise what blue is, though it may enable him to understand by analogy from certain other senses the sort of function that colour has in our interpretations of the outer world. A blind person may therefore be placed in the position of being able to behave quite intelligently in relation to certain questions involving colour.

Since the essential purpose of Exposition is to cause to arise in the mind of the pupil a combination of elements exactly corresponding to a combination at that time existing in the mind of the expositor, it is easy to see that in sensory matters such as colour, taste, and smell, it may well happen that Exposition fails, because the necessary elements are not present in both minds. But there is a certain source of danger, even when all the

[1] For a very graphic and intelligible account of the relation between ideas that depend on outward stimulus and those that arise within, see Huxley's *Hume*, pp. 61-73.

elements are present in both minds. It is quite possible that the elements may be differently combined in the teacher-mind and the pupil-mind. Sometimes the combination formed in the pupil's mind is quite reasonable, and teacher and pupil may talk for long enough about the matter without discovering that they are dealing with combinations that do not agree. It was only by a chance statement in an examination paper that a teacher discovered that one of his best pupils had been for years under the impression that John Knox had been hanged. The cause of the error was a misinterpretation of the remark made by the teacher in class: "John Knox was then sent to the galleys." Not having heard of the galleys, and being familiar with the word *gallows*, the pupil made the natural enough assumption that Knox was hanged. The mistake ought to have been discovered by a comparison of dates, but schoolboys are very willing to accept on trust a hypothesis that fits in with all the demands of a given lesson. Usually the combination of ideas in the pupil's mind is, as in this case, quite intelligible to the teacher as soon as it is exposed. But occasionally pupils who have had quite a different early training from that of their teachers may make combinations that are unintelligible even when laid bare. An English master could not understand the word *smake* that occurred in a Scotch boy's essay. He gathered from the context that it was something to eat, but could not accept the boy's confident explanation that it was a small steak. Careful inquiry brought out the fact that in the boy's family circle this was the accepted meaning, its origin being a corruption of the metrical version of the Hundredth Psalm. This had been taught to

the children before they could read, by making them repeat the words after the nurse. Since they could not understand the real sense, they had, from a fundamental necessity of human thought, to supply a sense of their own.

Know that the Lord is God indeed ;
Without our aid he did us make : [did a smake]
We are his flock, he doth us feed,
And for his sheep he doth us take. [doth a steak]

Custom legitimised the new substantive *smake* in the family circle, and the boy did not realise that it was not current in the outside world.

Speaking generally, the best way of preventing serious misconceptions of the kind we have been dealing with is to encourage the interchange of ideas in class. This it is that to some extent justifies the otherwise unreasonable desire the teacher has for reproduction of knowledge by the pupil. But the best form of reproduction is that which applies knowledge already acquired, rather than merely produces it for inspection. In the give and take of genuine class teaching there is every chance that misconceptions of all kinds will be exposed, not necessarily to the teacher but to the pupils themselves. Many a brilliant howler is lost to the school because the pupil himself learns in time, from the work that is going on in the class, that the answer he would have given had he been unfortunate enough to be called upon is not exactly the sort of thing that would commend itself. The teacher has the further satisfaction of knowing that not only does this exchange of ideas serve the particular ends of Exposition, but is in itself of such importance that it may fairly be treated as a fundamental part of the work of education. Mr. H. G. Wells, for example, lays it down that the chief function

of education is to cultivate just this form of interaction.

> The pressing business of the school is *to widen the range of intercourse.* It is only secondarily—so far as schooling goes—or at any rate subsequently, that the idea of shaping, or, at least trying to shape, the expanded natural man into a citizen comes in.[1]

It is clear that for this improvement in intercourse there must be not only agreement in the methods in which minds work, but substantial agreement among the results of mental process. To put the matter baldly, there must be agreement between the mental content of teacher and pupil if there is to be communion between them. Exposition has for its aim the establishment of this agreement. Even random intercourse between teacher and pupil will, if continued long enough, lead to the discovery of whatever disagreements exist between the two mental contents. But for satisfactory work it is necessary to have some common standard to which both contents may be referred so as to bring out inconsistencies. This standard is to be found in the outer world. Teacher and pupil alike may test their idea-combinations by comparison with what goes on in the world around us. After all, our mental content is primarily made up out of our reactions upon the outer world, and the value of our combinations of ideas may be tested by seeing how far they will work in relation to the state of things outside of us. The combinations in every normal mind can stand this test of seeing whether they "work" or not in our ordinary life. Unless our inner world and the outer fit into each other, there is obviously something wrong. It is not perhaps too strong a statement to make, that a great deal of

[1] *Mankind in the Making*, p. 214.

Exposition has for its object the building up in the mind of the pupil of great combinations of ideas that correspond with the facts of the outer world. It is obviously of the first importance that we should carefully consider the nature of the two worlds, and particularly their relation to each other. The outer world is not only a standard by which to compare two inner worlds—the teacher-world and the pupil-world—but the source of the pattern upon which all inner worlds are built.

The plain man has no difficulty in believing that there is a world outside of him, and that this world is full of objects upon which he acts and which in turn act upon him. He has no doubt whatever that he knows this outer world, and that it exists independently of him; that it has existed before he was born, and will exist when he has passed away. Some people, by reason of greater opportunities, may know more of this world than do others, but it does not occur to the plain man to doubt that it is possible to know it at all. This is left for certain philosophers who point out that all we can ever know is made up of our own sensations and the interactions and combinations of these sensations. Out of the elements of sensation each of us builds up a world of his own, but thinks that world exists outside. At first sight it appears easy to demonstrate the absurdity of a theory that maintains that there is no outer world at all, but that each of us makes up a world of his own. So soon as we try, however, we find that the theory has a great deal of fight in it, and that the troublesome philosophers have much to say for themselves. It is found that all our proofs ultimately come back to the evidence of our senses. We are confined within the circle of our own experience, and though we believe

that there is an outer world, we cannot prove its existence.

Do I see a water-carafe before me, or do I only experience certain sensations of light and shade? It makes matters no better when I stretch out my hand and feel the carafe. I only add a bundle of new sensations. Even when I pour out some water and drink it, I am no further forward. I have only multiplied sensations. I have not got beyond the range of my own personal experience. I believe that there is a carafe there, but I cannot get at it. There is the word *carafe*, and there is the complex bundle of sensations that make up my version of a carafe. But is there a real carafe, independent of me, a carafe that exists when I am not there to perceive it, a carafe-in-itself? This problem of the existence of a Thing-in-itself apart from any perceiving being is of great importance in philosophy, but for the plain man it is an excellent problem to give up. Let us honestly beg the question. Let us acknowledge that we cannot prove the existence of an outer world independent of us, and let us at the same time take it for granted that there is an outer world.

The very use of the words "an outer world" implies the existence of a world that is not outer. With this inner world we are on friendlier terms. We feel at home in it. We seem to be free from criticism there. No one from without can penetrate within it. We are ourselves the only persons capable of passing judgment on its existence and nature. When we speak of the mind's eye we imply that there is an inner world that we can look upon after the fashion in which we examine the outer world. This would suggest a resemblance between the two worlds. Most people

when questioned would say that their inner world is a reproduction of the outer, a sort of vaguer and less vigorous duplicate of what exists outside. As a matter of fact the inner world is in part[1] a reproduction of *our experience of* the outer world. When we close our eyes and recall a past experience involving elements depending on the outer world, there is without doubt a reproduction of what occurred in the past, including those elements; our present vague experience is similar to, though feebler than, our past.

But this is not quite the same thing as to say that the inner world resembles the outer. Our mental picture of a water-carafe, even when we are looking at it, may not at all resemble the real carafe, the carafe-in-itself. All that we can say—but this is quite enough for the practical purposes of life—is that there is a *correspondence* between the inner and the outer worlds; they fit into one another, and both remain constant. Whatever the carafe-in-itself is really like, it always causes the same mental picture to arise when we look at it; it always reacts in the same way to the different senses. So that, after all, what it is really like is not of any moment, since we can never by any chance get at this real appearance.

We are apt to picture the inner world as made up of ghostly water-carafes, tables, houses, mountains, seas, skies, clouds, all combined in an orderly way, a sort of well-arranged storehouse of shadowy things that correspond to the things-in-themselves that form the real world. This view

[1] Part of our inner world is originated "on the premises," if the expression may be permitted. Our feelings and desires, for example, must be considered as essentially of the inner world alone.

may be compared with that stage of thought that we have already referred to as the Thing stage. In this the earliest stage of thought, the world is assumed to be made up of a great series of independent things, each existing by and for itself. The stage is illustrated in the drawings of children and savages. There each thing is drawn separately, and set down on the paper apart from the others. It is only when we begin to see the relations between the individual things that we realise that they are not so independent of each other as they seem. This marks the rise of the Law stage, at which relations are studied and reduced to order and classified. Most people pass through both the Thing stage and the Law stage. But comparatively few reach the third stage known as System, in which the Laws themselves have their meaning brought out by being referred to great general principles that dominate them.

The "things" that make up the inner world are sometimes referred to as ideas, concepts, or images. The last name is applicable only when we are dealing with the direct reproduction of a particular experience. If I call up a mental picture of a particular table that I am familiar with, I have an image. But if I merely think about table in general I can have no particular picture, for I do not know enough about it; or, if you like, I know too much. I do not know whether to picture the table as round or square, or with four legs or three or six; and yet I know that it may be pictured in any of these ways. This kind of general idea that cannot be reduced to a picture is the kind that is properly called a concept. It must be general enough to include all kinds of things that belong to its class. The concept *table*, for instance, must be ready to

include all kinds of tables—round, square, oblong, oval, hexagonal—but it must never *be* any of these. It has to pay for its extreme generality by the loss of the power ever to become particular. The concept has the power of crystallising out into any particular example of that concept, but it possesses this power only on the condition that it shall never exercise it, without the result ceasing to be a concept and becoming a generalised image or type.

This generalised image or type stands between the mere image and the concept. If I look at a particular dog Ponto here and now present, I have a percept. If in the absence of the dog I call up in my mind a picture of this very dog Ponto, I have an image. If now I call up in my mind a picture of a dog that is not a reproduction of any particular dog that I have ever seen, but stands for a type of all dogs, a sort of pattern of dog in general, I have a generalised image of dog. This generalised image differs from the concept, since the latter cannot be represented as being any special kind of dog at all, but can only be thought about. The generalised image of a dog may be any species of dog, but it can be of only one species; it may have any colour I please (consistent with the possibilities of dog nature), but it must have some colour; and so on. The conceptual dog has all the qualities that are essential to all dogs: it must have four legs, a tail, two eyes, hair, and so forth; it must have colour, but no special colour; must have size and weight, but no fixed size and weight. Thus the concept gains in generality what it loses in definiteness.

Even in reading about the concept one gets irritated at its extreme elusiveness, and in actual experience people fall back in despair upon the

generalised image, and do their thinking by means of that. We shall see later that some writers object very much to this more or less pictorial thinking, and certainly it has some disadvantages. We must not give up the freedom of thought that comes from the extreme generality of the concept, but on the other hand we need the support of the generalised image, to assist the mind in dealing with concepts. When we use the generalised image we are really thinking of "dog in general," but *by means of* a concrete particular dog — though *which* particular dog is irrelevant.

The question may now be asked whether the inner world is made up of concepts or images. It would appear that there is room for nothing but images. How can one construct a world in which tables are not allowed to be any particular kind of tables, but only tables in general, that can be thought about but not represented? This difficulty brings out the distinction between the static and the dynamic view of the concept. Each of the views is sound, though each emphasises a different aspect.

The static view of the inner world is that it is made up of a great mass of more or less attenuated representations of "things," all arranged so as to fit into each other's qualities and positions. But such a world is inert, dead. It exists only to be examined by logical persons who are concerned about definition and classification. For the ordinary needs of life there must be the possibility of interaction among the elements that make up the inner world. It is here that the dynamic view has the advantage. The concept of a table is no longer to be treated as a mere group of the essential qualities of a table, but as a force determining

particular lines of action. If you ask an ordinary intelligent person what a table is, you will probably find that he has some little difficulty in saying precisely. Does this mean that because he cannot define a table he does not know what a table is? Assuredly not. He is able to behave intelligently in relation to tables. To understand a term it is not necessary that one should be able to define it. Definition has no doubt its proper place. The moment we need to discriminate carefully between different terms we have to define them more or less accurately, and more or less consciously. But we must not let the definition dominate us. If we are asked, what is chalk? we may turn to the dictionary and find that it is "a soft earthy substance of a white, greyish, or yellowish-white colour," etc., or we may simply say it is something to write on a blackboard with, or to improve the head of a billiard cue with, or to make carbonic acid out of. Some are inclined to say that these are purposes to which chalk can be applied, but that they do not tell us what it is. Chalk, they say, is a chemical compound represented by the formula $CaCO_3$, that and nothing else. But chalk is as much a thing to write with as it is a chemical compound. This is a world in which we react upon chalk in various ways, one of them being a chemical way; but this way is no more fundamental than the others.

We must remember that classification is of the mind and not of the world. We find it necessary for our human needs to classify objects, but this is for our convenience, and is not at all binding upon nature. Among young students there is sometimes a certain impatience with nature. They get their carefully prepared classification in

books, and are not a little indignant with nature when she does not see her way to fit into the arrangement in every case. For example, there is a troublesome little Australian mammal called the *Ornithorhynchus anatinus*, that is the despair of the taxonomist. It is a web-footed quadruped, with a bill like a duck; and it lays eggs like a bird or reptile. There is no place for this creature in any of the recognised classes, and to make a new class for it by itself is extremely disconcerting. There is a touch of remonstrance in the taxonomist's statement:—

> The lowest order of the *Mammalia* is that of the *Monotremata*, constituting by itself the division *Ornithodelphia*, and containing only two genera, both belonging to Australia—namely the Ornithorhynchus and the Echidna.[1]

This is not the place to show the value of such a hybrid specimen in leading us to discover the real nature of the different classes to which it might claim doubtful admission, and especially in making clear the relation between these classes. What is more germane to our subject is the place to be found in the mental content for such exceptional cases. Ruled out of the well-known bird and reptile classes, and thrust into a little class of its own, the ornithorhynchus is still intelligible to us; we at least know what we mean in speaking of it. Every one who has read this chapter thus far has formed some sort of idea of the creature, and there are as many ideas of the ornithorhynchus as there are people who use the term. If the reader examines his idea he will find that it is modified by what he knows about Australia, about ducks, about bills, about mammals, quadrupeds, eggs, birds, reptiles, and even Greek.

[1] H. A. Nicholson, *Manual of Zoology*, p. 630.

In spite of all such troublesome exceptions there is a use for the exact classification that admits of no deviation from the strict marks that distinguish each group. Classification is of the mind, and so is the idea of the irritating ornithorhynchus. But each represents a different department of mental activity. The limitations imposed by the laws of classification are logical; the additional materials supplied from individual experience of exceptions to those laws have to be dealt with as psychological units.

In the next chapter ideas will be treated as active. Here it will be enough to deal with them as the elements out of which certain combinations are to be formed. In Exposition the teacher has already in his mind a certain more or less elaborate combination of ideas, forming the expositandum. The pupil may have all the necessary ideas lying about loose as it were. It is, then, the teacher's business to build up those ideas in the pupil's mind into the desired whole. It may be (in fact this is the ordinary case) that the pupil has only certain of the needful ideas at his disposal. In this case the teacher has to present the necessary new ideas as well as to arrange the ideas at present possessed by the pupil.

Exposition may therefore be regarded as essentially a constructive process, and under ideal conditions it need never be destructive. In building up knowledge, fact should be added to fact in such a way that it is never necessary to undo what has been done. A combination of ideas once formed should be for all time. Something approaching this ideal state of affairs may be reached in the case of subjects that are removed from the ordinary interests of everyday life. In certain branches of

mathematics, and in the higher reaches of many of the other school subjects, it is possible for the teacher so to dominate the presentation of entirely fresh matter that each new fact falls exactly into its appropriate place. In teaching Latin, for example, there is nothing to hinder the master from deliberately determining beforehand the exact order in which the various points shall be presented to the pupil. Yet even when, as in this case, the arrangement of the presentation is entirely in the hands of the teacher, it sometimes occurs that in order to give complete understanding of a given fact two other facts must be presented simultaneously. Neither without the other will be capable of throwing light upon the point to be explained, and since in actual practice one must precede the other, it is occasionally necessary to present one because on the whole it is somewhat more relevant than the other, and yet the fact that has lost precedence may in certain respects deserve to come first.

Apart from this difficulty that is inherent in the nature of things, there is the ever-present trouble that we can in almost no case start quite fair. We have very seldom indeed the clean sheet that ideal Exposition demands. Our pupils generally come to us with their mental content already fixed with regard to many of the matters we have to deal with. Accordingly we cannot limit ourselves to the building up of new wholes out of entirely fresh elements. Our elements are not fresh, and there are wholes already in existence.

Thus it comes about that there is a destructive as well as a constructive stage in Exposition. When the existing combination of ideas is not to our satisfaction, we must demolish it before we can begin to reconstruct it in the way we desire. We

are all familiar with what takes place when a pupil changes from one teacher of the violin to another. Almost invariably the master is determined to have his style of execution adopted, and in order to secure this insists upon his pupil beginning at the very beginning. When the violinist turns back his pupil in this way, his idea is to break up the previously formed co-ordination of muscular actions, and establish in its place a co-ordination that will fit in with the later complex movements demanded by the approved execution. In ordinary Exposition it is seldom that we require to carry destructive work so far. It is usually unnecessary to reduce a given combination to its elements in order to correct some false collocation. The pupil may have the view that the further south one goes the warmer it becomes. All his experience warrants him in maintaining this view, and he holds it with some vigour. It is not at all necessary that the complex that corresponds to "south" in his mind should be reduced to its elements and painfully reconstructed on correct lines. All that is necessary is to break up the existing unwarrantable connection between south and increasing temperature. To the pupil *south* still remains *south* in every other attribute, but the new element of relativity is introduced, and the pupil learns that while moving to the south always involves change of average temperature, it does not always involve the same kind of change. In ordinary Exposition it is usually sufficient to stop far short of ultimate analysis, and to begin the reconstructive process with units that are not nearly the lowest possible.

Further, it has to be noted that the destructive process may be necessary not because the combination is in itself objectionable, but because there is a

need for the elements of which it is composed, in order to build up a new complex. In a given combination certain elements become so firmly welded together that their individual existence is overlooked, and it becomes the teacher's business to break up the fixed combination so that the elements may become available in other connections.

In the ultimate resort, however, Exposition as Exposition is a process of building up. The destructive process is no doubt important, and indeed essential, but it is none the less merely preparatory to the real work of Exposition, which is constructive. Learning a subject means really the building up of various ideas into an organised whole in which each finds its appropriate place. Ideas in this sense must be regarded as representing activities. It is only when fact has become faculty that we have really learned.

It is clear that when we speak of a combination of mental elements we give no indication of the extent to which the combination is carried. In Exposition we have frequently to seek out simpler ideas in order to explain those that are more complex. The unit of Exposition, therefore, becomes important. Naturally the ultimate unit is the individual idea. But in practice the simple individual idea is found to be very difficult to separate out and manipulate. It has always a strong tendency to take to itself other elements and appear as a complex. In what are called "Object Lessons" in school there is a strong tendency on the part of the teacher to wander into an explanation of the qualities of objects, and to lose sight of the object itself. He yields to the lust of analysis; and whatever the subject, the lesson is apt to drift into a discussion of the meaning of

such terms as opaque, brittle, elastic, fluid, friable, metallic. But while the teacher's tendency is thus towards abstraction, the pupils are inclined the other way, and are found to be continually interpreting the abstract terms in connection with concrete objects. When the teacher wishes to elicit the idea of whiteness, he gets from the pupil the answer *chalk*. "What do you mean by brittle?" asks the teacher, and the natural answer is *glass*.

The unit of Exposition must of course vary with the stage of advancement of the pupil. As we progress in a subject the unit naturally grows bigger. Very many errors in Exposition arise from using a bigger unit than the state of advancement of the pupils warrants.

CHAPTER III

MENTAL ACTIVITY

THE Laws of Thought as Thought are purely general and abstract. They take no account of the material upon which the mind acts. Yet this material is of the very essence of Exposition. We have seen that under certain reservations we may regard ideas as the material upon which the mind operates. This is their passive aspect. Ideas in this relation are regarded as the mere furniture of the mind, its stock in trade, its acquired possessions. So treated they are termed "presented content."

Ideas are also said to possess a certain degree of "presentative activity," which may be generally defined as the power to force an admission into consciousness. Every idea that has ever been in consciousness has by that very fact acquired a certain degree of this activity, and this amount is increased every time the idea finds its way back into consciousness. It is conceivable that at a given moment the presentative activity of every idea that had ever passed through a given mind should be tested and registered. If this practically impossible feat could be accomplished, we would have a systematic arrangement of ideas in order of their accumulated presentative activity for that mind.

Now it is clear that if this state of affairs represented the whole truth, only a few ideas would ever get into the mind at all, unless it were able to take in an unlimited number of ideas at a time. For naturally those with the greatest presentative activity would force their way into the mind and would resist all the attempts of the less powerful ideas to dislodge them. As a matter of fact, however, ideas with comparatively little accumulated presentative activity may acquire a temporary power sufficient to dislodge for the moment all others. Suppose we are studying Shakespeare. The ideas called up by his plays have in the course of time acquired a great accumulation of presentative activity. Yet at the moment of our most intense study of *As You Like It* a sudden street call may displace Rosalind and Orlando from our thoughts in favour of shrimps or cat's meat. To be sure, the Shakespearian ideas immediately resume their place in virtue of their greater accumulated activity as individual ideas, and also because of the support they give to one another as parts of an organised group.

For ideas do not remain in the consciousness as isolated units. They are always bound more or less closely to the other ideas that happen to be present in the consciousness with them. It is of course impossible to say how many ideas may be in the consciousness at any one time. The number must vary greatly according to the degree of concentration that marks the moment. It may be said that if there are one or two particularly active ideas in the mind there is no room for any others. The same fact may be more truly expressed by saying that the consciousness is sometimes concentrated on a few points and sometimes spread over a large number. Except in pathological cases, we have

always more than one idea present in the consciousness, and in normal cases there is usually a more or less uniform distribution of the available consciousness among the ideas presented. It is common to speak of the "field of consciousness" as representing the area within which ideas are active. This field is often regarded as being round, perhaps from a more or less conscious comparison with the field of vision as dealt with in linear perspective, where it is represented by the base of the cone of visual rays. Within this field some of the ideas appeal to us at a given moment much more than do others. We figure those ideas to ourselves as occupying the centre of the field, and therefore we call them focal. Those somewhat removed from the centre may be called sub-focal, those near the circumference sub-marginal, and those on the circumference marginal. The nearer an idea is to the centre, the greater its share of consciousness. It is obvious that the same fact may be expressed by saying that the ideas with the strongest presentative activity occupy the centre, and those of less activity have to content themselves with a place in the sub-focal, sub-marginal, or marginal area. In other words, we may speak literally of the distribution of consciousness, or metaphorically of the activity of the ideas.

In order to make this figure workable it is probably necessary to assume that the field of consciousness is capable of more or less rapid change of area. Sometimes it is very small and contains only a few ideas. Under such circumstances the distinction between focal and marginal almost disappears; the few ideas present are practically all focal. At other times the area is wide, and the number of ideas correspondingly increased. In this event the focal ideas are not so intense as in the case

of the smaller field, but they are much more intense than are those in the outlying regions. We have to assume that the total amount of consciousness available at a given moment is limited, and that therefore the problem is largely one of distribution.

There is danger of over-rigidity in the figure. No exact line of demarcation can be drawn between focal and sub-focal near the centre, and none between marginal and sub-marginal near the circumference. The figure of the field has the advantage that it renders impossible the older view that really implied that only one idea at a time passed through the consciousness. In psychology it is frequently necessary to correct one metaphor by means of another. The "field of consciousness" figure corrects the old linear view that confined itself to the seriatim procession of the focal ideas, but in its turn errs by confining itself to one plane. Professor James's[1] figure of the "stream of consciousness" or the "stream of thought," with his various graphic illustrations, emphasises the element of bulk or mass in our mental content. It has the further advantage of indicating a procession of force as well as material. In the field figure there is merely the suggestion of a place where the ideas may disport themselves. The stream figure, by its very nature, implies the crowding in of new matter and the passing away of old. Naturally the figure must not be too closely pressed, for in thought there is usually a core of preferred ideas that retain their place in the middle of the stream, while a great body of ideas passes rapidly along at the margins; whereas in a real river the opposite is the case, for the water in the middle moves more rapidly than the water at the margins.

[1] *Principles of Psychology*, vol. i. p. 279 ff.

It will probably be well now to pass on to a more general statement of the facts of the case in less figurative terms. The word "continuum" is becoming more and more popular as a term to describe the mental content at any given moment. The word indicates a great mass of ideas held before the mind; but the ideas are not regarded as lying loose, they are bound to one another, they form a more or less homogeneous whole. The binding force may be said to be a common purpose or a common interest. The purposive interest that dominates the continuum may be concentrated, and may tend therefore to limit the number of elements; or it may be diffused, and may take in a large number of elements. But whether the elements of a continuum are few or many, they never remain long fixed in the same relation to one another. Constant change is of the essence of the continuum. There is a continuous coming and going of mental elements. When we are thinking steadily on a given subject, the core of the continuum will be fairly large in proportion to the whole, and will remain fairly constant, whereas in easy general talk, or in attending to the details of ordinary life, the continuum is liable to violent changes in its elements, and the core is restricted to that minimum of common elements that ensures the preservation of our sense of identity.

We have treated the elements that form a continuum as if they were separate from each other. No doubt in ultimate analysis the contents of any continuum could thus be reduced to independent elemental units; but in practice it is found that ideas have a tendency to group themselves. Under identical circumstances in the experience of the same individual certain continuums are likely to

have almost identical content. But even in a continuum that has never before invaded consciousness it will be found that its elements are more or less definitely arranged in groups. These groups of ideas, sometimes known as apperception masses, have been formed by the co-presentation in consciousness of the ideas in question. They must therefore have formed part of previous continuums, though their accompaniments in any two of these continuums may never have been the same. In considering how those groups have been formed it will be well in the first place to begin from the side of the mind rather than from that of the idea, in order to counteract the tendency to regard the ideas as things independent of the mind. After the mental activity has been acknowledged, there will be less harm in working out the attractive mechanism of apperception in terms of ideas.

In the older-fashioned theories of the association of ideas, certain general principles were laid down that were useful enough so far as they went. But even when they were gathered up into one generalisation as in Sir William Hamilton's Redintegration,[1] they gave little help in the way of explaining the building up of great groups of ideas, though they certainly explained very ingeniously many mental phenomena after they had occurred. Fr. Paulhan in his *L'Activité mentale* works out a more active system of association which ultimately resolves itself into two great laws, a positive and a negative. The positive law he calls the law of systematic association. It runs :

> Every psychical fact tends to associate to itself, and cause to develop, the psychical facts which may harmonise with it,

[1] *Lectures on Metaphysics*, Lecture xxxii. p. 238.

which may strive with it towards a common goal or for complementary ends, which, along with it, may be able to form a system.[1]

The negative law deals with inhibition or arrest:

> Every psychical phenomenon tends to prevent the production or development, or to cause the disappearance of psychical phenomena which cannot be united to itself according to the law of systematic association, that is to say, which cannot be united with it for a common end.[2]

These two laws, working under the impulse of purpose, secure that the various modes of being conscious that are of special value to the mind shall recur with sufficient frequency to establish an ease in reinstating themselves whenever they are called for, and we have thus the beginning of the process that results in the organisation of the mental processes in relation to the mental content. What we call organised groups of ideas or apperception masses may from another point of view be regarded as organised modes of being conscious.

Treating the matter now from the point of view of the ideas, it is to be noticed that the two most important laws correspond in general with those of Paulhan. Ideas that are called contrary ideas, that is, ideas that belong to the same category but differ within that category (such as blue, green, and yellow, which come under the same category of colour, but differ inasmuch as they are different colours), arrest one another. This means that in the competition to enter consciousness, contrary ideas oppose each other, do everything they can to eject each other, and finally, as the result of the strife, one or other succeeds in effecting an entrance and in expelling the other. It may be objected that two contrary ideas may occupy the conscious-

[1] *L'Activité mentale*, p. 88. [2] *Ibid.* p. 221.

ness at the same time. We may think of a geranium with green leaves and red petals. But here the ideas of red and green are not treated by the mind as mere colours, but only as aspects of a whole. We think of a geranium, in fact, not of red and green. This brings out the distinction between the having of an idea and the realising of that idea. When we merely *have* an idea, or admit an idea to the mind, we treat it as a more or less representative element that is significant or that embodies a meaning. To *realise* the idea of red we must concentrate upon it all the forces that are appropriate to an idea of colour, and in so doing we are drawing off all the force that might otherwise have been concentrated upon green or some other colour. In so far then as red and green as colours both retain their place in consciousness, neither is fully realised, and their relation to each other, and to the mind in which they are found, is one of unstable equilibrium, the force of each being spent in trying to further its own fuller development, and to eject the other from consciousness.

The law of systematic association, on the other hand, applies to those ideas that are known as disparate. These ideas have no inherent relation to each other, they do not belong to the same category, and so can be formed into any sort of complexes that circumstances may favour. There is no inherent connection, so far as we know, between a grey overcoat, a white horse, and Napoleon I.,[1] yet by the actual collocation of these ideas in history they form a complex that has a certain stability of its own. Taking that overworked example of the psychologists, the orange,

[1] If we could view these elements *sub specie aeternitatis*, no doubt we would discover a sufficient cause for their collocation.

we find that its qualities are grouped together in the same way. All the ordinary complexes of life are built up in accordance with the law of systematic association, or the law of complication as it may be called when regarded from the point of view of the ideas rather than of the mind.

Besides the two forces of complication and arrest there is a third that has to be taken into account in connection with the interaction of ideas. This is known as *fusion*. When the same idea occurs frequently it fuses with the traces it left at its previous visits. It is by this force of fusion that our elementary ideas acquire the stability that is so necessary as a foundation for the whole superstructure of ideas. In the case of two complexes being brought into consciousness together, all the similar elements in the two fuse, all the disparate elements proceed to form a new and more elaborate complex, while the contrary ideas arrest each other.

It must not be supposed that fusion is limited to the substantive elements of thought. Similar relations that recur fuse as to their common elements and strengthen the idea of this particular class of relation. The compelling power of analogy owes much to fusion.

Fusion is always at work in the mind. For the common elements in the different groups strengthen each other as elements every time they appear in consciousness. Two ideas that are contrary to each other, and therefore seek to arrest each other, still so react upon the rest of the mental content that by fusing with similar elements in that content they really acquire a little more strength, that is, increase their accumulated presentative activity, even while being driven out of consciousness for the moment by a stronger rival.

Complication is obviously the converse of analysis. After we have broken up one group of ideas in order to reconstruct the elements into another, the rebuilding is largely a matter of complication. Naturally fusion is going on parallel with complication; for all the elements common to the two groups, instead of forming a complex, merely go to strengthen each other. But arrest is also present in complication. Its main work in forming new groups is to prevent the accumulation of unnecessary details.

Every idea seeks to introduce into consciousness all the other ideas with which it has formed connections. An idea, therefore, that forms a part of many apperception masses has a dangerous tendency to recall too many ideas with which it is allied in different groups. Of the ideas thus invited into the consciousness some set up a process of fusion, and others of complication, but a large number are cut off by the process of arrest. If it were not so, thinking would become impossible. The mind would be smothered under the crowd of ideas.

Exposition consists fundamentally of the establishment of new combinations of ideas, or of the making clear and strong combinations that at present exist in a vague and feeble way. To give the new combinations strength we must have as great an amount of fusion as is possible under the circumstances. Richness and breadth depend upon complication. Clearness and definiteness are gained by arrest. That all three processes may produce their best results there must be many presentations of ideas and idea groups. But this is largely the work of Illustration, and will be dealt with in later chapters.

In addition to the Laws of Thought as Thought and the various laws of association with which we have dealt, there is another law of greater generality and of fundamental importance in the art of Exposition. It is in fact the ultimate impulse to mental activity, the equivalent in the mind to gravitation in the material world. It may be called the Law of Mental Harmony. The ideas within the mind must be at peace with each other. The moment friction arises there must be ceaseless activity till the disagreement is removed. Consistency among the ideas is an essential to mind. All the mental content must be harmonised; there must be no contradictions in the arrangement that has been imposed upon the ideas. It does not of course follow that each mind must be able to resolve all the contradictions that occur in the course of thought, but the mind must try to reconcile them. This is of its very nature, and the necessity is not limited to the intellectual class. The mind of the savage is as sensitive to the need for internal peace as is the mind of the savant. On the other hand, the universality of the need for internal peace is compensated for by the varying degrees of reconciliations that will satisfy it. What the savage cannot explain in terms of science he can in terms of superstition. In fact, one of the main functions of superstition would seem to be the satisfaction of this imperious mental need. The invisible wind has no mouth to make the weird moanings that disturb him, so the savage is impelled to get rid of this apparent contradiction of the rest of his experience. Accordingly he personifies the wind, and thus supplies it with the necessary apparatus, without rousing any further difficulty. At later stages, it is true, the latent difficulties appear, and

the more sophisticated successor of the savage has to invent some other plausible explanation. The mind is exacting in its demand for some explanation or other, it is less exacting in the quality of the explanation it accepts.

Herbert Spencer gives an interesting account of the stages by which he arrived at what he considered to be the truth[1] about the colour of shadows. At the first stage he regarded them as black, since he had been accustomed to use India ink to represent them in his drawings. At eighteen he was told by a friend that all shadows are neutral tint, but "it was only after my friend had repeatedly drawn my attention to instances in nature, that I finally gave in." He held the neutral tint view for some years, though he did observe "that the tone of the neutral tint varied considerably in different shadows." The divergences, however, "were not such as to shake my faith in the dogma." His peace of mind was at last disturbed by a statement in a popular work on optics: "the colour of a shadow is always the complement of the colour of the light casting it." He wanted to know "*Why* are shadows coloured? and what determines the colour?" As a result of his investigations:

> It became manifest that as a space in shadow is a space from which the *direct* light alone is excluded, and into which the *indirect* light (namely, that reflected from surrounding objects by the clouds and sky) continues to fall, the colour of a shadow must partake of the colour of everything that can either radiate or reflect light into it. Hence the colour of a shadow must be *the average colour of the diffused light;* and must vary, as that varies, with the colours of all surrounding things. Thus was at once explained the inconstancy I had already noticed; and I presently recognised in Nature that which the

[1] "The Valuation of Evidence," *Essays* (1891), vol. ii. p. 161.

theory implies—namely, that a shadow may have any colour whatever, according to circumstances.

Here, then, respecting certain simple phenomena that are hourly visible, are three successive convictions; each of them based on years of observation; each of them held with unhesitating confidence; and yet only one—as I now believe—true.

Further, the mind does not go out of its way to seek for troublesome inconsistencies. So long as no questions are raised it is quite content to accept things as they are. A teacher giving to a young class a lesson on a bluebottle asked how the creature made its familiar buzzing noise. When she received an answer, she told the children that she expected that answer. Of course they thought the bluebottle buzzed with its mouth, because when they wanted to buzz they did it with their mouths. Accepting the teacher's word that they were wrong, the class had no peace till she told them that the buzzing was caused by the wings. This gave the children perfect satisfaction, as it did the teacher, till her Normal Master pointed out that if you remove the bluebottle's wings it does not stop buzzing, but actually buzzes a little harder than usual. It was now the teacher's turn to be worried, and it was not till she had learned about the special little buzzing organ [1] that she could drop the subject and be at peace once more.

Every mind contains a large number of contradictions that give rise to no trouble because they are not perceived. The two sets of facts lie apart, and are never brought into contact with each other, so the mind is content with its erroneous correlation. It was an experienced M.D. with a tincture of literature who confessed that he had just discovered the true meaning of a "flash in the

[1] Discovered by Landois. T. H. Huxley's *Anatomy of Invertebrated Animals*, p. 377.

pan." He had all along associated the proverb with the frying-pan. He knew quite as much about flint-locks as about frying-pans, but he had never had occasion to connect the proverb with the firearm. The same sort of thing is seen in relation to our precepts of religion and of business. We usually keep them carefully apart. Indeed, it is the business of the earnest and faithful clergyman to bring face to face the precepts from the two spheres and ask his congregation to reconcile them. His success is measured by the degree of discomfort he is able to introduce into the minds of his hearers. So soon as he has introduced dispeace among the elements of the mental content, he has produced a disturbance that cannot be set at rest till in some way or other the exposed contradiction is reconciled. No doubt churchgoers are often very successful in effecting a superficial reconciliation, but this must be honestly satisfactory so far as it goes, if the person affected is to get any peace.

There is no such thing as deliberate self-deception in our attempts to restore harmony between apparent contradictions. The wish, no doubt, is often father to the thought; but in the cases we have in view the contradiction is assumed to have been brought to light and placed clearly before the consciousness, so that the wish cannot generate the thought, much as the mind may desire it. When Shakespeare says of the false Duke Antonio:

> Who having unto truth, by telling of it,
> Made such a sinner of his memory,
> To credit his own lie,—he did believe
> He was indeed the duke,[1]

he is describing what Antonio would have liked to

[1] *The Tempest*, Act i. sc. 2.

believe, rather than what he did believe. No doubt the usurper was full of arguments to justify himself in ousting his brother, and these arguments probably gave him a great deal of consolation, but they could never convince him that "he was indeed the duke." As a matter of fact, the greater the efforts he made to deceive himself, the less likely would he be to attain his end, for he would only be keeping more prominently before consciousness the contradiction that he wished to remove. In his efforts to deceive himself, he would be doing what the good expositor is continually doing when he seeks to break up a false combination of ideas in order to substitute a true one. For this co-presentation in consciousness of ideas that are really contradictory to each other is an essential part of the process of Exposition. It may be called *Confrontation*, since it implies the bringing face to face ideas that cannot live peaceably together.

In Confrontation it is assumed that both terms of the contradiction are known to the person concerned. If this is not the case, no real confrontation can take place. I once tried to prove to an Arran farmer that the earth is round. I did not succeed. He was in the wrong, no doubt, but his was a mind of the most vigorous kind, a mind that worked admirably within its limits. These limits excluded all the scientific ideas that make it necessary to believe that the earth is round. All the ideas that had access to the farmer's mind were on the most friendly terms with all the other ideas to be found there. So soon as any one is able to introduce into that man's mind an idea that is inconsistent with the flatness of the earth, a disturbance will be set up that may lead to the true

arrangement of his ideas on this subject, but is more likely to lead to a rearrangement which shall explain the particular inconsistency of which he has been made conscious, without necessarily corresponding to what we call fact.

The principle of Confrontation is nowhere better illustrated than in the Socratic method. It was the custom of Socrates to begin his discussions by a demand for a definition, which in his ironical way he often represented to be a help to himself in getting at the true meaning of the subject under discussion. It was not long before he proceeded to confront the ideas put forward by his interlocutor with certain other ideas that he knew formed a part of that interlocutor's mental content. The opposition thus disclosed gave an excellent opportunity of stimulating that inquiry that was always Socrates' aim. The method, in fact, has almost always three stages. First, there is confidence without proper foundation; next, as the result of Confrontation, there arises doubt and desire to attain to the truth; then, in the third place, certainty founded on legitimate grounds. It is true that in some of the actual Socratic dialogues the third stage is not attained, the Master contenting himself with the disturbance that he had set up, well knowing that the interlocutors could not settle down till they had reached some sort of conclusion, which if not perhaps so satisfactory as one that could have been supplied, had at any rate the compensating advantage of having been attained by the effort of the thinker himself. This method of unfinished exposition may be permissible in the case of advanced pupils, but with the ordinary school-boy it is generally better to carry the dialogue to its legitimate conclusion. The work of

the ordinary school affords many opportunities to apply the method of Confrontation.

To illustrate, take the case of that constant difficulty at the early stages of composition, the incomplete sentence. Pupils brought up in illiterate homes are very apt to make a relative clause stand by itself, with no other help than the original grammatical subject. In secondary schools, where the pupils come from homes in which grammatical English is habitually spoken, there is not so much danger of this particular form of error; but every teacher in a school for the poorer classes is unpleasantly familiar with such a sentence in a pupil's exercise book as :

John who broke the window.

The following is a verbatim reproduction of a lesson actually given to a class of about sixty-five rather dull boys of average age $11\frac{1}{2}$. The sentence had occurred in one of the class exercise-books, and was placed on the blackboard, as it had been written, with the addition of a comma after the word *John*.[1]

Teacher. Now, what did John do ?
Pupil (confidently). Broke the window.
T. Then what did *who* do ?
P. Broke the window.
T. Were there two windows, then ?
P. No, sir.
T. Then who broke it ?
P. John.
T. And what did *who* do ?

[1] The class had gone through a regular course of instruction on the nature of the sentence, and knew *in theory* all about sentence-making, and the distinction between a sentence and a mere phrase. The purpose of the lesson, therefore, was not so much to communicate new ideas as to give a meaning to ideas already known, and to increase their presentative activity by co-presenting them to the consciousness in their proper connections.

P. (doubtfully). It says "*who* broke the window."
T. Did it take two to break the window?
P. No, sir.
T. Then which of them did the breaking?
(Pupils puzzled, no answer.)
T. How many people were there altogether?
P. (cautiously). *John* and *who*.
T. Now, which was bigger, *John* or *who*?
P. They're both the same.
T. Then there was only one person there?
P. Yes, sir.
T. And what was his name?
P. John.
T. And what did he do?
P. Broke the window.
T. Then, would it not be enough to say: "John broke the window"?
P. Yes, sir.
T. Is that what it says on the blackboard?
P. No, sir: it says "John, *who* broke the window."
T. And *John* and *who* are the same person?
P. Yes, sir.
T. Then, they both have the same right to the verb?
P. Yes, sir.
T. Which of them is nearer the verb?
P. *Who*.
T. What mark is between *John* and the verb?
P. A comma.
T. Now if only one of the two can claim the verb, which has the better right to it?
P. *Who*.
T. And every noun and pronoun that is a subject must have a verb?
P. Yes, sir.
T. Then if *who* gets "broke," what verb is left for *John*?
P. None.
T. How many subjects are there here?
P. Two.
T. And how many verbs?
P. One.
T. And every subject must have a verb?
P. Yes, sir.
T. How many verbs do we need, then, besides "broke"?
P. One.
T. Give me one.
(No answer.)
T. John (who broke a window) did something, or was something. What would you do if you broke a window?

P. (promptly). Run away, sir.[1]
T. Finish it, then. John, who broke a window— ?
P. Ran away.
T. Which are the two verbs now ?
P. "Broke" and "ran."
T. Which belongs specially to *who* ?
P. Broke.
T. And to *John* ?
P. Ran.

In this and in all other applications of the Socratic method the teacher is really leading, though he seems to be following. He knows from the beginning the goal he desires to reach. He knows, further, the ideas the pupil already possesses, and feels that it is his business so to manipulate those ideas that they shall ultimately form the combinations he desires.

But when we say that the pupil possesses certain ideas, we do not mean that these ideas are necessarily present in the consciousness of the pupil when the lesson begins. At any moment in a given mind only a very limited number of ideas can be functioning. The mind is capable of being conscious in a great variety of ways, but is not capable of being conscious in all those ways at one and the same moment. When we say that a mind possesses a certain idea, we mean that that mind has a permanent potentiality of acting uniformly under certain identical conditions as often as those conditions recur. An idea not in consciousness may therefore be regarded as a permanent possibility of appropriate response to certain stimuli.

[1] In the actual lesson this answer led to the inevitable moral rebuke, from which the teacher returned to the main subject as above. As a matter of fact, the teacher was severely criticised for not substituting in the final part the moral "paid for it," instead of the discreditable "ran away." It does seem a petti-fogging distinction ; but I am inclined to think the critics were right.

The field of consciousness is limited, and unless an idea happens to be within that field at a given moment, it would seem to be powerless, and indeed practically as if it did not exist. While we are thinking at this moment about consciousness and activity, myriads of ideas that in ordinary speech we may be said to possess are lying dormant, and exercise no influence upon the ideas that are at present in consciousness. Our ideas about rock-crystals, for example, are as if they had no existence. But the important point has to be considered: are all our ideas that are not within consciousness at a particular moment equally inert? When a man is thinking of the power of ideas, for example, are his ideas about rock-crystals and his ideas about John Locke equally ineffective? He is not thinking about either Locke or crystals, but we have the general feeling that Locke is nearer to his thoughts at the present moment than are the crystals. Though Locke is below the threshold of consciousness, he somehow seems nearer that threshold than do the crystals. Is there then a differentiation among the ideas that are out of consciousness corresponding to the differentiation we have seen to maintain within consciousness? It would seem that between the conscious and the unconscious there is a clear dichotomy. We are either conscious of an idea or we are not; anything that is below the threshold is therefore out of consciousness. Perhaps our trouble arises from a too rigid application of our figure of the threshold. There is something extremely definite in the idea of a threshold. A visitor either has or has not crossed it. He is either in our house or he is not. But if we are expecting him, or if we chance to see him coming up the walk, we are influenced by him before he is actually in the house.

The figure is not perhaps a very illuminating one, as it amounts, after all, to an illustration of consciousness by an appeal to consciousness. But since it is impossible to transcend consciousness, it is difficult to see how this community of subject-matter can be avoided.

Even if we could justify the rigidity of the threshold figure, there would still remain a certain vagueness about the mental content in the marginal area. Ideas are in constant motion about the threshold of consciousness, now on the line, now above, now below. An idea that is at the present moment below the threshold, but a moment ago was above it, and in another moment will be above it again, may be said to exercise a certain influence on the continuum on the borders of which it wavers. It is to meet cases of this kind that the term subconscious is used. Of course an idea must either be in consciousness or not; accordingly we must regard a subconscious idea as in some way or other within consciousness. Yet from the way in which the term is used one would almost be led to think that it meant that certain ideas are in the consciousness without our being conscious of them—a clear contradiction in terms. By the Law of Excluded Middle there seems to be no place for the subconscious between the conscious and the unconscious. Yet it is obvious that there is a difference between an idea that is hovering on the verge of consciousness, and one that is lost in the limbo of unconsciousness and may never again return to consciousness. Logic may rule out the subconscious, but Psychology must find it a place.

To begin with, it has to be admitted that ideas that are not present in the consciousness exercise a certain influence upon ideas that are in the

consciousness, and if an absolute distinction is demanded, it may be satisfactorily put for practical purposes as: At any given moment an idea may be said to be subconscious if without being itself within the consciousness it exercises an influence on ideas that are at that moment within the consciousness. It is easy to see that an idea that has just left the consciousness may leave behind it an influence that does not cease the moment it passes over the threshold. So with an idea that is coming up towards consciousness, it should not be very difficult to persuade people that it may cast its influence before it, and thus to some extent act within the mind before it appears. But we must go further, and admit that ideas may exercise an influence within the mind even if they do not reach the consciousness at all on the particular occasion that we examine. When we are dealing with a difficult and complicated problem, for example, we call into the consciousness a large number of relevant ideas and carefully examine them in relation to each other and to the problem we are working with. But as we shall see more fully later, we cannot at will recall all the relevant ideas. By skilful manipulation we may gather together most of the significant ideas, but some at least remain outside consciousness. Are these uncalled witnesses without influence on our decisions?

The answer would appear to be that ideas in the subconscious region do exercise an influence upon ideas within consciousness, even though on the occasion in question they do not emerge at all above the threshold. The mind is dealing with a knotty problem in some such dangerous subject as Political Economy—noted for its pitfalls. The ideas at present in the continuum seem to fit into each other

quite naturally ; there is therefore internal harmony, and the problem seems to be solved. Yet the mind is not satisfied. It has an uneasy sense that there is a flaw somewhere, and goes on calling up all the available ideas connected with the subject in order to discover some possible error. For long nothing adverse turns up ; but by and by an idea rises above the threshold and breaks down the hypothesis that was in all other respects satisfactory. This belated idea may be reasonably supposed to be subconscious at the time that the hypothesis was formed, thus causing the disquieting vague impression. Further, it would have been none the less subconscious even if it had not come up in time to break down our hypothesis, or had never come into the consciousness at all. It might quite well have caused the uncomfortable feeling in the mind without coming up in time to warn the thinker. When the thinker's critics point out the flaw, the subconscious idea rises into consciousness, and the thinker recognises that it had given him a vague warning though it did not reach his consciousness in time to prevent the blunder.

The phenomena of the subconscious may be readily correlated with certain of the theories of brain action. If the associations formed among ideas correspond to interrelations established among certain brain-cells through their functioning in a systematic way in response to certain stimuli, it may well be assumed that when certain cells are stimulated to the necessary extent, certain corresponding ideas rise into the consciousness. This stimulation has the natural tendency to spread among the other systems, but of course it will spread more easily among systems correlated with ideas that have formerly been connected with the ideas at

present in consciousness. It may plausibly be suggested that within the brain there is a sort of physical replica of the field of consciousness; certain neural systems are in a high state of excitement—these correspond to the focal ideas. Systems in various decreasing degrees of excitement may well correspond to the various degrees of obscuration of the ideas till tracts are reached that though stimulated by the general impulse that affects all the system we are dealing with, are not sufficiently stimulated to cause a definite idea to rise into consciousness. Such tracts will correspond to the ideas that are in the subconscious state. If the neural system concerned is thoroughly well organised, as must be the case with regard to the system that regulates our thinking on any subject of which we have an intelligent knowledge, it will be impossible to stimulate some of the tracts up to consciousness pitch without at the same time stimulating all the correlated tracts into some degree of activity. Accordingly, even the most remote relevant ideas will be raised to at least the subconscious state, and the whole system so energised that its elements require only a very slight additional impulse to send them up into consciousness.

This additional stimulus is what we seek to give them by our ordinary methods of dealing with problems. We put ourselves in the way of stimulating certain ideas. We turn to books where we know such ideas are treated. This gives us the primary set of ideas. The systems corresponding to these primary ideas stimulate a great many other systems at the secondary and tertiary degrees of remoteness. If our system of ideas is perfectly co-ordinated, then the relevant neural tracts will inevitably be stimulated in their proper order

and the corresponding ideas will present themselves to consciousness, just as they are required for purposes of thought. This, indeed, does happen in well-regulated minds when dealing with subjects in which they are quite at home.

It goes without saying that this parallelism between the physical and the mental in no way commits us to materialism. Even if we could correlate every idea that passes through the mind with a definite corresponding cell in the brain, we would be no nearer than we were before to the solution of the problem of the relation between mind and matter. The physical parallel has been introduced here mainly because it gives a certain confirmation of the view taken with regard to the place of the subconscious in mental process. If the theory adopted with regard to the subconscious fits in with the hypotheses of certain physiological psychologists, there is the greater likelihood of its being true. In any case, the analogy serves as a useful illustration, and after all, if analogy is not always itself a reliable argument, we are told that it often indicates that a reliable argument exists.

CHAPTER IV

MENTAL BACKGROUNDS

PAINTERS are familiar with the phenomena of what they call Turbid Media. Colours vary according to the colour tone of the material upon which they are laid. This is what the Hon. John Collier has to say on the subject:

> Rub a little ivory black thinly over a white canvas, it will appear a distinct brown; mix the same colour with white, it becomes a neutral grey; brush this grey thinly over a black ground, it will have a distinctly bluish tinge; so that the same pigment can vary from a warm brown to a blue grey without admixture with any other colour but white, merely in accordance with the manipulation it receives. Yellow ochre gives similar results; when lightly brushed over a white ground it seems a rich orange, when brushed in precisely the same way over a black ground, it seems a sort of green.[1]

So with the mind. The same idea has to harmonise itself with quite a different tone according to the nature of the background against which it is projected. The groups of ideas that give body to the stream of consciousness may be, without too violent a figure, compared with a background, which like every other background has a powerful influence on our view of any element worked into the foreground. Naturally the analogy is more complete

[1] *Primer of Art*, p. 59.

when we deal with the affective aspect of thought or speech. Public orators of a sentimental turn are not uncommonly guilty of falling into a rhapsodical mode of expression, a sort of "Ah!" strain, that renders them blind to the real meaning of the ideas they use. The emotional background is too strong for the ideas that are projected against it. Next morning, in cold blood, the orator usually sees his mistake; indeed, there is a danger that the cold daylight criticism may go too far in the other direction, for it has always to be remembered that there are occasions when the value of an idea must not be judged too closely by the logical standard. Still, there is something wrong when the emotional background retains its paralysing power even through the callous period of proof-reading. The following occurs at the end of a sermon-tale to children by a well-known London clergyman, who published it along with other sermons in book form in 1891:—

> And away down in 81st Street a woman was stitching what seemed like a little nightgown, but, ah me! it was not that—it was something sadder still, for her little dear baby had died; and the mother's heart was full, and the tears would flow.

Apart from the background of this sad sermon-tale no one would think that "a little nightgown" was a particularly sad object, only less sad, in fact, than a little shroud. Yet so powerful is this background of sentiment, that not only did it blind the preacher at the time, but completely deceived two different classes of divinity students to whom I had occasion to lecture, and upon whom I took the liberty to experiment. My subject was the preparation of sermons for the young, and I read the passage—naturally beginning a little bit before the dangerous part in order to give the background its proper effect — to illustrate a psychological

principle. In both cases the implicit absurdity escaped detection, though, when it was pointed out to them, the young men were much chagrined that they had allowed it to pass.

But the figure of a background in mental matters is not limited to the affective tone. It has a useful application on the ideational plane. We have found that each idea that occurs to the mind must make itself at home there. It must harmonise itself with its surroundings; and must take a different meaning according to the mental background against which it is projected. The presented content may be quite neutral, or it may have a positive tone of its own. In both cases the new idea or ideas must submit to a modification of tone or meaning from the effect of the background.

Take some such colourless sentence as *Think of him*, and note the difference effected by projecting it against the following backgrounds :—

A picture in *Punch* of a low-class photographer trying to encourage a pleasant expression on his female sitter's face.

A widow laying flowers on a grave, and addressing her little girl.

A religious revival meeting.

A French schoolmaster during the Franco-Prussian war pointing to a portrait of the first Napoleon.

A conspirators' meeting where a traitor's name has been mentioned.

A crowd of starving "unemployed" watching the Lord Mayor pass from his carriage to a City banquet.

The same thing applies to an idea dealing with a concrete object, say a fish. Note how the emotion aroused varies according to the background.

Against a background that includes the Early Christians and the Catacombs it arouses either a deeply religious or a mildly antiquarian interest. Try it now against a background of Astronomy, Sport, Bread-winning, Geography, Art, Science, Slang, Heraldry, Asceticism.

Most of the honest, that is unmalicious, misunderstandings of life are the result of failing to make allowance for the background in the mind of another. When the same ideas are presented against different backgrounds, the resulting confusion is so inevitable that common speech needs a special name to express this particular form of misunderstanding. When people are at "cross purposes" they are dealing with the same words in different connections, which is the same as saying that the meanings are modified by the backgrounds. Here we have passed beyond mere tone, and have reached the region of relation among the elements that make up the content of mind. The careless, unreflective man takes it for granted that the idea he sends forth from a given background will find a corresponding background in the mind of his hearer or reader. Fortunately his expectation is usually justified. By the very fact that two minds are in communication, they are placed in such a relation as to encourage the development of the same background. But at the very beginning of a conversation there is sometimes a little difficulty. The preliminary talk between two persons, before coming to the real point, is a sort of tuning up, a kind of mental feeling for the proper pitch. This preliminary talk has sometimes been compared to the few passes that a pair of fencers make before coming to the real business of the encounter. But the figure of finding the pitch is perhaps nearer the truth.

Many people—particularly young people—are irritated at what they call "beating about the bush." No doubt the principle *in medias res* is admirable, if we are sure that we and our interlocutor are to be in the middle of the same *res*. If two men meet to discuss the same subject, they are probably provided with the same backgrounds, or at any rate closely similar backgrounds; but even then a certain amount of harmonising may be necessary. It is quite possible that each may view the subject against a background quite differently made up, though composed of the same elements. People who argue for the sake of arguing, people who write to the newspapers, almost invariably deal with ideas in the light of their own backgrounds, and refuse to take the trouble to discover the mental background against which the same ideas are projected in the mind of the person with whom they debate. If we desire to convince another person that his view is wrong, we must endeavour to find out exactly what that view is; we must discover what sort of background his ideas are projected against.

The reason why we are so seldom at cross purposes is that we rarely move out of our own set. All societies are made up of sets or coteries, each of which is marked by the possession of a common series of backgrounds. In dealing with those of our own set we have no difficulty, and dealing with our own set makes up the greater part of life for most of us. It is when we have communication with our political opponents, with members of a different church, with foreigners, even with members of some of the ordinary "anti-" societies, that we realise that our ideas do not seem to have the effect upon our interlocutors that we intend.

Teachers in a more or less conscious way feel the need of bringing their own backgrounds into harmony with those of their pupils. Young teachers in particular soon discover that their questions do not produce the answers they were intended to elicit. A question is asked, for example, the answer to which is known to be within the range of the pupil's knowledge. There is no doubt about the matter. The teacher knows from immediately preceding experience that the answer is in the pupil's mind only waiting to be drawn out. Indeed, the question may be fairly regarded as nothing more than a stage in the process of making clear and distinct an idea that the pupil already possesses, though in a vague way. The question is, however, so expressed that the pupil, with the best intention in the world, cannot discover against which background he is expected to project the ideas concerned. Accordingly he projects them against the first available background, in the hope that this may be the right one.

"Where was St. Paul converted?" asks the teacher, speaking from a geographical background. "In the ninth chapter of the Acts," responds the pupil, from a background of textual reference. In testing the intelligence of a class, the inspector asks: "Where do you find gates?" The pupil, from a background made up of puzzling experiences of the Socratic method, answers: "We don't find gates, we make them." From an historico-geographical background the inspector desired to elicit the deleterious effect of a large town on the purity of a river. He brought out the fact that Robert the Bruce spent his latter years at Roseneath on the Clyde, and that as a recreation he very probably —according to the inspector—fished in the river.

The question that was to incriminate those who were responsible for the pollution of the Clyde took the form : "Why couldn't the Bruce fish there now ?" From a background of plain common-sense came the reply : "Because he's dead."

It is manifest that what we are here calling mental backgrounds correspond to what we have already spoken of as continuums ; but we are now treating them from a new point of view. Hitherto we have been concerned with the relative clearness or obscurity of the elements that make up the continuum ; now we are interested in the varying effects of the same idea according to the continuum in which it is found. Instead of considering the effect of the diffusion and concentration of consciousness on the composition of the continuum, we now examine the change produced on a given idea by the company in which it finds itself. The management of mental backgrounds is clearly an important part of the process of Exposition ; accordingly we must study the mechanism of these backgrounds ; we must look into the problem of mental scene-shifting.

With regard to the elements out of which the backgrounds are worked up there is probably a greater uniformity than would at first sight be expected. The ultimate elements, the products of sense-perception, are practically uniform, though no doubt even here there are differences corresponding to the physical conditions of the sense organs. But even admitting the general uniformity of elements, there remains a vast possibility of differentiation through variety in combination. Given a hundred minds with precisely the same ideas as presented content, it is probable that no two of them have the ideas arranged in the same way.

The order in which the ideas were originally presented, and the circumstances of the different persons concerned, have brought about a necessary variety in the combinations. It is obvious that it is impossible to make a classification of minds on a basis of mental content without practically attempting to "exhaust the universe," though a rough-and-ready classification may be very serviceable for practical purposes.[1] But with respect to the mechanism by which combinations are effected there need not be the same difficulty. Minds may be divided into three classes according to the degree of stability they establish among the elements as components of complexes. Naturally there are certain complexes of ideas that are formed to correspond to certain complexes of objective phenomena. These complexes owe their stability to the uniformity with which they react satisfactorily upon the conditions of actual experience. But certain other complexes depend for their stability upon the quality of the mind in which they are formed.

From this point of view the first kind of mind may be named the *rigid*. It is marked by the close connection that is maintained among the elements that go to form a given background. Instead of moving freely among themselves, the individual ideas form a complex once for all, and can hardly be separated from each other. The rigidity may result from the emotional tone; we may refuse to break up our complex because we prefer to have the elements arranged in that way.

[1] Such studies as Dr. Berthold Hartmann's *Die Analyse des kindlichen Gedankenkreises als die naturgemässe Grundlage des ersten Schulunterrichts* (Leipzig, 1896), show that a good beginning has already been made in this kind of classification.

This is the case with the stubborn little cottage girl who in Wordsworth's poem refused to break up the combination of herself and her brothers and sisters into a group of seven, merely because two of them were dead. The poet does his best to break up the complex:

> "But they are dead; those two are dead!
> Their spirits are in heaven!"
> 'Twas throwing words away: for still
> The little maid would have her will,
> And said, "Nay, we are seven!"

The extreme case of this rigidity is to be found in that form of insanity that bears the name of *l'idée fixe.*

Very frequently the natural tendency of certain minds towards rigidity is intensified by bad teaching, teaching for the sake of immediate results rather than for the sake of the power that comes from the organisation of ideas. It seems to save time to present ideas in ready-made boluses. Education, however, should be free from the trammels of such time conditions. The ultimate result is the only thing worth considering. We are not here concerned with the practical difficulties of supplying the best possible equipment for life's work in the limited time at the disposal of the teacher in the case of the average child. Few questions are of greater importance than that of making the most of the short school time available for the artisan class. But at present our aim is to get at the best ideal state. Once this has been determined, Educators may be in a position to discuss what compromise, as a compromise between what ought to be and what is, will lead to the best result. Obviously we must know the best possible, before we can examine how closely we

can approach it without attempting to overstep the limits of our powers.

The backgrounds formed by rigid minds may be termed *fixed*. Naturally no background can remain permanently fixed, except perhaps in the case of the insane, but in ordinary life we find modified forms of *l'idée fixe*. Your dull matter-of-fact man regards all things of the same class against the same unvarying background. He finds the greatest possible difficulty in knowing what nimbler-witted people mean. The same ideas are presented to him and to them. He cannot understand why they produce such a different effect in the two cases.

We shall see later that up to a certain degree of elaboration it is a distinct advantage to have fixed complexes of ideas, but beyond that degree fixity is a thing the teacher must fight against. In the case of rigid minds it is obviously of prime importance that the first presentation of a given complex of ideas shall be properly made, since any change at a later stage will be exceedingly difficult. To prevent the evil effects of rigidity, then, the best means is to present the component elements in as simple a form as possible. This does not mean merely in the easiest forms, but as nearly as may be in the forms resulting from ultimate analysis. The mind we appeal to ought to do its own combinations. It does not, of course, follow that the mind we deal with will form a different complex from that we have ourselves formed. The skilful teacher will indeed manipulate his facts so that the pupil will form precisely the same complex as the less skilful teacher would present as a ready-mode bolus. But the fact that the bolus-fed pupil and his better-taught compeer form the same final complex,

in no way proves that the resulting knowledge is of the same value in the two cases. There is a fundamental psychological difference between ideas grouped by the mind itself, and the same ideas in the same grouping when that grouping has been presented ready-made as the result of the operations of another mind. It is true that even when the mind has made its own complexes of ideas there may be unhealthy rigidity in the result. Some minds are naturally inelastic. That class of mind that Roger Ascham calls *harde wittes*[1] is inclined to be unduly rigid. Great care must accordingly be taken that the true complex should be suggested at an early stage, and further, continual exercise should be given in dealing with the same ideas in different connections. Exercises of all kinds have their uses in this way. Every time that the teacher is able to satisfy the reproach that is implied in the complaint "But you said so-and-so," he is loosening the too rigid bonds that unite ideas.

After all, *harde wittes* form capital material for the teacher to exercise his skill upon, and it is not difficult to see that old Roger has a warm side to this class of pupil. But every teacher dislikes the opposite type of mind that, for want of a better name, may be called the *fluid*. In this case there is no fear of too close a connection among the ideas that form a background. They are allowed to roll about in the mind pretty much as the molecules of a liquid mingle with each other. Some complexes must of course be maintained in a position of comparative stability else the mind would fall to pieces altogether. But the complexes are at any time easily broken up. To this type of pupil one

[1] *The Scholemaster:* The first booke teachyng the brynging up of youth. Arber's Reprints, p. 34.

complex is as good as another. But even here we must try to get the mind to do its own combining and building up. No doubt we shall have to use stronger inducements, and we must find better and firmer bonds. Above all, we must keep on repeating those connections that we seek to impress on the pupil-mind. Instead of seeking out exercises in which the individual ideas are exhibited in different connections, we must confine ourselves to those that illustrate the working of the ideas in the same connection though under different aspects. The complex must as before be made by the pupil himself, but, once made, it may be greatly strengthened by the outside influence of the teacher.

The fixed background is in general more characteristic of mature life; the unstable background is common in school. The necessity of childhood to grow as well as to live, makes it imperative that material for growth should be gathered from all parts. Accordingly it is an arrangement of nature that children should be restless in body so as to secure an all-round physical development, and restless in spirit in order that they may derive materials from all their environment. A child may have a more or less strong inherent tendency to develop fixed backgrounds, but at early stages it is unusual to find this tendency very prominent. Our great difficulty is the instability that characterises the youthful background. We are never quite sure that the ideas of this minute will be projected against the same background as the ideas of last. Among grown-up people those who are silly, giggling, flippant are usually those with unstable backgrounds. What is often called the Associative mind is of this class. No doubt the force of association tends to

make ideas cohere. But in the case of fluid minds association exercises its power rather in promoting a flow of ideas than in consolidating ideas into organised groups. A word is enough to divert the stream of thought. Dame Quickly is the *emeritus* example of a mind of this sort—though, unfortunately, we do not need to go so far afield for abundant examples of the type. The background against which the ideas of Dame Quickly project themselves can hardly be called stable. It is more like a rapidly moving panorama than an ordinary picture.

The third class of mind, as characterised by its backgrounds, is the desirable one that may be named the *plastic*. This type of mind forms its own complexes with fair ease, and at the same time is able to retain them in that state that prevents deliquescence on the one hand and rigidity on the other. The resulting backgrounds are *mobile*. They remain steady as long as they are required to be steady, but are ready for immediate change if that is found desirable. They are stable enough to allow a very gradual change, and mobile enough to submit to sudden fluctuations if need be. Nimble-witted people are marked by a high degree of mobility of background.

To illustrate the working of mental backgrounds, take the cases of a congregation listening to a sermon, students listening to a lecture, and a person reading a poem. In the sermon, as a rule, there is no call for violent change of background. Frequently, indeed, the lines are laid out beforehand, the heads are given, and the work of the preacher is to develop these heads, the work of the listener to supply the appropriate and slowly changing background. So with the instructive lecture. Fact

after fact is introduced, but for each fact a place has been prepared. At the very start of the lecture the teacher, if he knows his business, has referred to some fact that he is sure lies within the knowledge of his hearers. This prepares the way for a background different from that which previously existed in the students' minds. As a rule, that previous background is not of much consequence. It is usually made up of floating ideas of omnibuses or stairs or note-books or whittling pencils. If the students have just come from an examination, or from a college row, or even from a specially interesting lecture, the power of the background they bring with them may be much greater, and much more difficult for the new lecturer to deal with. Under adverse circumstances like these, the teacher has two courses open to him. He may begin with a particularly striking sentence, in the hope of causing a rapid change of background; in which case he makes an assault upon the attention in the hope of taking it by storm. Or he may begin by saying nothing to which he attaches much importance during the first five minutes, in the hope that the old background will gradually give way, and enable him to establish a new one as soon as he begins to deal with the real matter of his lecture. This latter method is on the whole more likely to succeed. Replacing the old background item by item is a much more hopeful proceeding than an attempt to wave the conjuror's wand. A background cannot be called up at will. *Recall* is not quite the same thing. It is perhaps not very difficult to reinstate the background of a previous lecture. Indeed it ought to be easy, for all the help students usually get is the dry paragraph that follows the colourless opening: "Gentlemen, in our last

lecture——." But a real beginning is different. Why is it that the experienced railway reader prefers to start his journey with a "begun" novel? And if it is a little irksome to make a beginning of a novel, why is it still harder to begin to read a play? The answer is clearly that in both cases there is no background, and that in the case of the play the background is more remote than in the novel, where the author at least does his best to help the reader in supplying a background.

In reading a poem we are often called upon to make rapid and violent changes of background. This does not mean that we must suddenly change the whole body of thought that corresponds to James's stream. In reading a well-constructed poem the main body of thought remains constant in spite of the rapid changes called for by the accumulated figures of speech. The *as* of the figure suspends the main interest of the reader till the corresponding *so* releases it again.

At Virgil's invitation,[1] we leave the two Trojans and the busy Tyrians, and accompany him to the teeming bee-hive; but when the visit is over, we gladly return to Æneas and his friend. While we are with the bees, what has become of the Trojans and the Tyrians? Has the background of country life displaced entirely the background supplied by the surging city? Are our thoughts with the bees or with the Trojans and the toiling Tyrians? Different minds act differently here. The rigid mind prefers to remain with the Trojans and the Tyrians; it resents this interruption, looks at the bees with disapproval, waits impatiently till the poet sees fit to return to his proper work. The fluid mind, on the other hand, accompanies the poet gladly, forgets

[1] *Æneid*, Book i. 430.

all about the rising city, and revels in the new scene. The man of plastic mind readily supplies the new background that is necessary, but does not forget the old. His enjoyment of the new background is affected by the fact that it has a relation to the old one. The country scene has a different charm for him here, compared with what it would have had it occurred in, say, Wordsworth, where it would appear for its own sake. It is a case of turbid media.

Some minds treat such temporary backgrounds as ends in themselves, others as a mere part of a wider whole. Some keep the Tyrians before their minds all the time they are considering the bees. The interest for minds of this class lies mainly in the relation between the two sets of ideas. The toiling Tyrians are set over against the busy bees. Other minds can suspend for the time being the background supplied by Dido's new city, without letting it disappear altogether. The charm of comparison comes *after* the figure has been enjoyed on its own merits. Yet even while the figure is present, it cannot be treated quite as if it were an independent subject of thought. It lies on the surface of the stream of thought, it is true; it cannot be denied that it is focal, but the influence of the whole undercurrent of the stream is felt; the subconscious body of the stream influences our treatment of the surface current.

It is in the practical affairs of life that there is a call for sudden and more or less complete changes of background. The different business calls a man receives in his office every day need not involve a greater change of background than we have seen in the case of reading a poem. There is usually sufficient continuity to maintain the connection

between the parts. But if a man is interrupted in his business by household cares, or by, say, church concerns, the difficulty of maintaining a stable background is greatly increased. A man called away suddenly after a hard bargain with a business rival to deal with a case of conscience can hardly make the necessary change of background with the required rapidity. In this case there has to be a complete change in the body of the stream of consciousness before the required background can be attained. What happens, as a matter of fact, is that at the beginning of the new interview there is a good deal of confusion of thought. The new background is not distinct. It is affected according to the laws of turbid media by the background that has not yet had time to disappear. After a little, thought becomes clearer, ideas are gradually rearranged, the old background becomes so dim as not to interfere with the new, and the change is effected.

So far we have been dealing with backgrounds as wholes. But the elements that make up a given background are not combined as simple and independent units. They are all grouped together more or less firmly into different complexes, and these complexes form the real units of combination. In all descriptive writing and speaking it is assumed that the reader or hearer has the necessary complexes at hand ready made. The more cultured the audience with reference to a particular subject, the greater the degree of complexity the expositor is entitled to assume in the combination unit. When a novelist sets his scene in a mediaeval castle he assumes that his readers have a complex of ideas that corresponds to his own. He does not begin with the elementary ideas of portcullis, barbican,

moat, drawbridge, keep, bailey; he assumes these to be present and arranged in a particular way. If the novelist uses the words "Norman Castle," he assumes what he has assumed before, but limits the possible combinations of the elements. If he mentions the century in which the castle was built, he makes a still higher demand on his readers' ability to conform to standard in forming complexes. If the novelist thereafter feels called upon to expand into description, he concerns himself entirely with those parts of the castle in question that are more or less peculiar to it. As a matter of fact, we have all a large supply of ready-made complexes that are in themselves invariable and may be used as composite units to build up any desired whole. The skill of the poet, the teacher, and the novelist is shown in the way they manipulate these complexes to form the whole that suits their immediate purpose.

The first general remark to be made about these ready-made complexes is that they owe some of their characteristics to the preferred sense of the person in whose mind they are formed. It is well known that minds differ in the class of impressions that affect them most. There are those who depend mainly upon the eye. These are termed *visuals*.[1] For them everything that is comfortably assimilated by the mind has been treated in terms of form, size, and colour. *Audiles*, on the other hand, prefer to deal with sounds. An audile enjoys being read to; a visual is unhappy unless he can read for himself. At the play the visual is most impressed by the scenery, the dresses, the gestures; the audile by the dialogue, the songs, the music. Those that are known as *tactiles* reduce everything as far as possible

[1] Some writers prefer the term *visiles*.

to impressions of the sense of touch. When we speak of a cat, the visual has an impression of its size, form, and colour; the audile remembers its purring or its caterwauling; the tactile reproduces in his consciousness the pleasant feel of its fur. The senses of smell and taste are not usually included in this classification; we do not as a rule speak of *gustatives* or *olfactives*. This is probably because these senses are of inferior importance in the building up of knowledge. There is no doubt, however, that they also have a considerable effect in modifying the way in which different people regard the same thing. A caution is here not out of place. We must not make the distinction too prominent. It is not to be supposed that an audile gets most of his information through the ear, but only that that is the best way to get at that particular person. He prefers to have his knowledge come through the ear. It is quite possible that the psycho-physicists may by and by be able to arrange the senses in their precise order of merit as knowledge-providers. But even if this absolute order of merit were to be published to-morrow, it would in no way affect the fact that people have their preferred sense. An audile may learn absolutely more from the sense of sight than from the sense of hearing, and be an audile none the less.

In dealing with mental backgrounds most of us have the prevailing impression of sight. For this an explanation may readily be found. There are more visuals than audiles in the world; and in addition the very word *background* drives us, by association, to visual impressions. Moreover, for the purposes of school, visual backgrounds are more useful than any others, for the very sufficient reason that we can to some extent at least compare them

with each other through the intermediary of an external standard. If the pupil is asked to think of a country town, a picture at once rises in his mind. This is his picture of a country town. If it is analysed, it will be found in all probability that it owes most of its characteristics to one particular town with which he is familiar, or in connection with which he made his first acquaintance with country towns. Further, the fewer country towns the pupil has seen the clearer is the picture that rises in his mind. To one who has seen a great number of such towns there is a vagueness about the picture. The peculiarities of the different towns are contrary ideas, and therefore arrest each other. Accordingly there is a struggle going on all along the line, and only the absolutely common elements remain clear. If now the man of many country towns is determined to have a clear picture, he can usually succeed; but the price that he pays is the loss of the picture of a country town in general, and the adoption of a particular town. His town is the pictured image of what he has actually seen. Indeed, this is the most common form. Instead of having a vague background ready-made, most people have more or less vague memories of backgrounds that actually exist. At first sight it may seem that there is no harm in this, and some may even be prepared to say that these pictures are better than vague generalised outlines. But when it comes to supplying backgrounds to ideas presented by another, it will be found that misunderstandings are apt to arise from the detailed character of the picture. The teacher's exposition may not fit into the pupil's picture because some detail in that picture is inconsistent with something the teacher has said. This detail is not essential to the general

background demanded by the teacher, and should therefore be eliminated. In a description, for example, the teacher may speak of the church as being on the north of the market-place, while in the pupil's picture it is on the east. The pupil's mind resents this, and a wrong attitude results. With a purely generalised picture of the village, the church can be put anywhere without rousing opposition.

A very interesting as well as useful exercise is to take the catalogue of an Art Exhibition before seeing the pictures, and try to realise what sort of picture corresponds to each of the descriptive titles. The man of many galleries succeeds fairly well. His mental picture of even such a tantalising description as "Portrait of a Lady" is not usually far wrong. But to the ordinary lay mind there will be little but disappointment. "Chill October," "With Daisies Pied," "In Spate," "Where the Bee Sucks," "Boors Drinking," "The Village Wedding," all raise pictures in our minds that do not correspond to what we find in the frames. Yet we cannot blame the painters; in each case we are constrained to admit that the picture justifies the name, and in most cases we are prepared to acknowledge that the painter's idea is better than ours. But for all that, the two pictures, his and ours, are not the same. So with description. However carefully a town may be described to you—in words—you will always find that when you reach the town itself it is not quite what you had pictured it to be. You cannot accuse your friend of describing it falsely or carelessly. Everything he has told you is justified by what you see. You admit that it is exactly as he described it to you—only it is different.

Now if practical issues depend upon this description, how easily you might be misled. Your picture

corresponds *at all the points of contact* with the description, but at all other points your picture is independent of the reality, and has no guidance. Let us not forget that the very vagueness of our backgrounds may have its use. It is this quality that enables us to fit them into so many different frames. If any discrepancy arises, it can be readily remedied, while as for the remaining unexpressed details they do not matter, so long as they do not imply a hidden contradiction. We sometimes forget how much work the reader or hearer has to do as the apparently passive partner in the process of Exposition. The writer no doubt brings his ideas together and lays them before us with more or less skill; but the reader has to supply his own backgrounds, and see that they agree with the ideas projected against them. Sometimes it happens that a discrepancy arises because in the mind of the writer the idea was originally projected against a false background, and the error is detected against the more accurate background supplied by the reader.[1] More frequently the reader's faulty background is exposed by the process of projecting the writer's ideas against it. A schoolboy who had never been in Edinburgh objected to his lesson-book for describing an attempt on Edinburgh Castle made from the steep cliff on the west side. His argument was that the steep cliff was on the east side. When asked to justify his criticism, he had nothing to say but a reiteration that the account must be wrong; this seemed to him self-evident. It was only when hard pressed by his teacher, who pointed out that the access was quite easy from the east, that the boy scornfully explained that climbing a high cliff out of small boats was not what he considered an easy

[1] This is worked out in greater detail in Chapter XIV. p. 339.

approach. The mention of boats led to further inquiries, when it came out that the boy was dealing with the only castle he had seen, which happened to be Dunnottar Castle, where certainly his objection held. He had simply taken the word *castle* to connote all the elements of the typical castle he had seen.

Apart from the errors arising from different conceptions of the content of the mental backgrounds, there is another source of danger. Exposition may fail because of what may be called mental parallax. The teacher and the pupil may project the same ideas against identical backgrounds and yet come to different conclusions because they view the ideas from different standpoints. The teacher may project a given idea against one part of the background, and the pupil against another. Much depends upon the point of view. Nothing is more important in Exposition than the selection of the proper point of view, and the securing of the coincidence of the pupil's standpoint with the teacher's.

The danger of a wrong point of view may be illustrated from our own adult experience when reading novels. Sometimes the author takes it upon him to keep us for several chapters in the company of the villain and his accomplices. Gradually we begin unconsciously to look at things from the villain's standpoint. There is of course in this case no real harm done; it is only a matter of tone. But the effect is quite perceptible. By and by when some virtuous person in the story comes along and interferes with the villain's plans, we experience a distinct, if momentary, annoyance.[1]

It must not be supposed that the point of view

[1] For further illustration see Chapter X.

is limited in its effects to the tone value of a lesson. It is equally important in Exposition that deals with the cognitive side. In the more practical parts of our teaching in which imitation is largely relied upon, we find the point of view of the first importance. In the various exercises in which the teacher shows the pupils by example exactly what they are to do, there is a special form of confusion that arises from difference in the point of view. This is the distinction between right and left. In ordinary life it is common to find a certain amount of confusion between the right and the left. Every stranger who asks his way in a great city has abundant evidence of the existence of this confusion. It is always well to test each direction at every turning. For "third turning to the right" we have frequently to read "third turning to the left." This arises partly from the confusion that inevitably occurs in an appreciable percentage of cases when we are dealing with two opposed directions. We have the same confusion to a less degree between east and west on a map, but not nearly so frequently between north and south. There may be other causes for the difference, but there can be little doubt that east and west are more readily confused because of their connection with the right and left of the map.

The fact that the wayfarer and the policeman who is directing him usually stand facing each other may have something to do with the resulting confusion. The wayfarer's left is the policeman's right. This source of error is not absent from school. The drill-master and the sewing-mistress standing in front of their class and trying to illustrate some motion run serious risk of confusion. They sometimes meet the difficulty by facing the same way as

the class, and doing the best they can under the circumstances. The position is awkward for both pupils and teacher, but is found to be on the whole the best way out of an almost impossible situation. An alternative is to stand facing the class, and then give the demonstration with reversed arms; that is, the teacher uses the right arm when he wishes the pupil to use the left, and *vice versa*. This naturally requires special training on the part of the teacher.

CHAPTER V

SUGGESTION IN EXPOSITION

We have seen that the process of influencing another mind acquires all the interest of a mystery, and the wonder of our being able to act upon the mind of another at all is increased when we discover that our own minds are far from being entirely at our own disposal. Psychologists are fond of pointing out that we cannot call up ideas at will;[1] that we are more or less at the mercy of chance recall;[2] that if "activity seems to be self-caused change,"[3] then we have no such thing as mental activity;[4] that even the inventor has to wait for some outside

[1] "Volition has no power of calling up images, but only of rejecting and selecting from those offered by spontaneous redintegration. But the rapidity with which the selection is made, owing to the familiarity of the ways in which spontaneous redintegration runs, gives the process of reasoning the appearance of evoking images that are foreseen to be conformable to the purpose. There is no seeing them before they are offered; there is no summoning them before they are seen." Shadworth H. Hodgson, *The Theory of Practice*, vol. i. p. 400.

[2] See the whole of the section on "Command of the Thoughts" in Prof. Alexander Bain's *The Emotions and the Will*, pp. 369-382, particularly the famous passage (pp. 376-7) in which the mind is compared to a wild beast waiting to spring upon its prey, as soon as it appears, but quite unable to hasten that appearance.

[3] F. H. Bradley, *Appearance and Reality*, p. 64.

[4] G. F. Stout, *Analytical Psychology*, vol i. p. 155: "It seems clear that if our whole conscious existence is so constantly

spark to touch off his loaded intelligence.[1] If we are distrustful of the evidence of the professional psychologists, we may turn to the evidence of the intelligent layman. The following is the view of a writer, not a professional philosopher, whose name is a household word on both sides of the Atlantic. The passage occurs in a private letter to the author.

> A curious thing is the mind, certainly. It originates nothing, creates nothing, gathers all its materials from the outside, and weaves them into combinations automatically, and without anybody's help—and doesn't even invent the combinations itself, but draws the scheme from outside suggestion . . .
>
> It does seem a little pathetic to reflect that man's proudest possession—his mind—is a mere machine; an automatic machine; a machine which is so wholly independent of him that it will not take even a suggestion from him, let alone a command, unless it suits its humour; that both command and suggestion, when offered, originate not on the premises but must in all cases come from the outside; that we can't make it stick to a subject (a sermon, for instance) if an outside suggestion of sharper interest moves it to desert; that our pride in it must limit itself to ownership—ownership of a machine—a machine of which we are not a part, and over whose performances we have nothing that even resembles control or authority. It is very offensive. Any tramp that comes along may succeed in setting it in motion, but *you* can't. If you say to it: "Examine this solar system, or this

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and thoroughly dependent on factors extraneous to it, there is no room anywhere within it for purely immanent causality. It is impossible to find any bit of mental process which is determined purely from within."

[1] F. Paulhan, *Psychologie de l'invention*, p. 10. Taking Newton as a typical case, Paulhan deals with the two essential elements, (1) the total results of Newton's previous thinking, and (2) the fall of the apple (or its equivalent) as the immediate cause of the discovery: "L'un indique la préparation lente de l'invention, la tendance qui travaille à se compléter, l'idée confuse cherchant l'élément qui la précisera; l'autre signale l'occasion venue, l'élément nouveau qui se présente engagé dans la perception (ou dans l'idée) d'où l'esprit saura l'abstraire, et détermine la synthèse nouvelle, la création intellectuelle."

Darwinian Theory, or this potato," you can only say it or think it when the inspiration has come to you from outside. And to think that Shakespeare and Watt, and we others can't even combine our idea-catches on plans original with ourselves, but that even the combination-scheme must come from the outside —gathered from reading and experience!

Meantime, *which is I and which is my mind?* are we two or are we one? However, it is not important, for if we say "I will think," neither I *nor* the mind originated the suggestion—it came from outside.

All this may be very depressing and even "offensive" to the ordinary man. To the teacher it is full of encouragement. For it must be remembered that in the process described he plays the part of the tramp. He does the stimulation from the outside. Archimedes prayed for a fulcrum for his lever, and promised that if his prayer were answered he would move the world. But as he could not step off the earth, the πού στῶ he desired remained an aspiration. The prayer that was refused to Archimedes in the physical world has in the mental been granted to the humblest teacher. So far from complaining that we are "prisoned in separate consciousness" and cannot share the consciousness of our pupils, we ought to rejoice that we are enabled to stand outside the mind-world of our pupils, and from our vantage ground there move that world. To what extent we can move it is a different question. For here we come to an aspect of the matter that restores our self-respect as human beings, though it diminishes our power as teachers. The writer just quoted is unduly depressed. It is true that the tramp can for the moment direct our attention this way or that at his will and against ours. But the amount of attention we give depends not on the tramp, but on the nature and content of the mind he seeks to manipulate. The power of the teacher, like the

power of the tramp, is limited to *directing* the mind's attention. The determination of the amount and the duration of the attention lies with the mind attacked.

For the comfort of the teacher, and the discouragement of the tramp, it is well to remember that the time element is very important to the full understanding of this matter. The ordinary tramp can command immediate but only momentary attention to a particular topic. If he happens to know the sort of things we are interested in, and is able to talk intelligently about them, he no doubt is in a position to retain our attention for quite a long while. But in doing so he ceases to form a part of mere external nature. He is no longer a plain tramp acting at haphazard. He is acting deliberately, and with a knowledge of what he is about. He is really usurping the teacher's place. Nor can we reasonably resent the exercise of the power he has over our minds. After all, it is we who have put this power into his hands. It is because we are what we are that he is able to manipulate us. To a certain extent he can make us act according to his will, but he can do this only by obeying the laws of our nature, by appealing to what he knows to be in us. He must adapt himself to us. He must respect our individuality. He must stoop to conquer.

Having learnt the lesson of the tramp, it is now our business to discover what means we have at our disposal to manipulate effectively the mental content of another mind. Immediate recall, in which an idea forces its way into consciousness by the mere strength of its accumulated presentative activity, offers no difficulty ; and mediate recall, that takes the form of sense stimulation, as in the case of

sights, smells, and sounds re-establishing a whole that formerly existed, is almost equally free from trouble. But in the ordinary case in which one idea recalls a whole mass we have a notable complication. For an idea usually belongs to several groups. Certain ideas, it is true, are for most minds restricted to one definite mass. They have nothing whatever to do with any other mass. It is the function of technical terms to limit such ideas to their proper mass and thus prevent confusion. The word *ohm* is, I believe, restricted to the science of electricity, and for the ordinary person has no connection with any other group of ideas. Even here, however, I have no doubt that in the mind of a competent electrician the idea of *ohm* will have connection with several masses.[1]

Speaking generally, every idea forms a part of several masses. When an idea, then, obtains admission into the field of consciousness and proceeds to introduce others by mediate recall, the question arises: Of the various masses with which it is connected, which will it favour, which will it tend to reinstate?

At first sight the obvious answer is, the strongest mass; that is, the mass that is richest in elements, is best arranged, and has the greatest accumulated presentative activity. A moment's consideration shows that if this were so, then in a given mind the same idea must always call up the same mass. But experience proves that this is not the case. It has to be observed that we are not here dealing with

[1] On making a casual test-reference to the term in conversation with a distinguished physicist, Dr. William Garnett, Educational Adviser to the London County Council, I found that in his mind it formed part of an historical mass, an economic mass, an educational mass, a laboratory mass, a workshop mass, a literary mass—at this point we were interrupted.

the effect of the same idea on different minds. It is easy to guess the mass that a given idea will recall in the case of chosen types of men. The idea of *vine* will naturally recall to the retired merchant who is fond of gardening, his greenhouse, to the *bon vivant* his favourite wine, to the devotee the fifteenth chapter of St. John, to the continental traveller the slopes of the Rhine or of Burgundy, to the art-lover certain pictures and schools of painting, to the botanist some particularly long words. All this is plain sailing. But suppose we take the case of a man who combines the six conditions. It is surely not impossible to find an old gentleman eager about his greenhouses, fond of wines and pictures, an enthusiastic amateur in botany, full of memories of happy walking tours on the continent, and withal a constant church-goer and Bible-reader. He would be a rash man who, without knowing the old gentleman, would venture to predict which of the six masses the idea of *vine* would call up. Even if we made his acquaintance and discovered which masses had the greatest power in his consciousness, we would have only a slight probability in our favour in guessing the strongest mass as the one to be recalled. On the other hand, if we learn that the idea was suggested to him while walking in his garden on an autumn evening when he had just become aware of the first appearance of frost for the year, we may with more confidence foretell the direction of his ideas. Yet even under these circumstances, if the old gentleman had during the afternoon given instructions about heating the greenhouses and so had his mind easy on the practical side, and if the friend with whom he was walking in the garden had been recalling escapades during their old Burgundy tramp, the chances are

that the idea of *vine* would rouse the geographical and reminiscent mass.

Before we can foretell the course of recall we must know (1) the contents of the mind in question, and the relative accumulated presentative activities of the masses; (2) the conditions under which the mediating idea is presented; (3) the actual contents of the consciousness immediately preceding the presentation.

It is obvious that this is no mere theoretical problem. We are here dealing with the fundamental problem of Exposition. We desire a given mind to act in a given way. Our first step must be to learn the laws according to which it acts, and the conditions under which these operate. Having acquired this knowledge, we are able to interfere effectively with the course of thought in the mind of another. In ordinary life we are continually doing this, often quite unconsciously. Our every action in relation to others cannot but modify the course of thought in those others. Our very presence often accomplishes such a modification without our even being aware of the existence of the person upon whose mind we have exercised an influence. For we have seen that we are all to a great extent at the mercy of external suggestion.

In applying suggestion for our special purposes, then, the first consideration in presenting a new idea is to discover against which background it is likely to be projected. Apart from any special circumstances that may complicate individual cases, there are certain backgrounds that may be called the normals for certain ideas. If this mark 13 be placed upon a blackboard, we are entitled to assume that it will be projected against a background of numerals and read as *thirteen*. But if we place the

word *Ethel* before it and the word *Jones* after it, we may be certain that it will be thrown against a literal background, and read as the initial of one of the names of a person. In nearly every case there is a preferential background against which an isolated idea will be normally projected. Naturally this varies according to the content of the individual mind. But examination will show that there is a general as well as a personal preferential background for each idea. It is useful for teachers to look into these preferences, both personal and general.

Take the case of homonyms. If the word *one* is uttered, most people who hear it will project it against a numerical background, though some will connect it with *win*. So with the word *two*; the numerical background prevails, though in this case there are three homonyms to choose among. It is clear that it is not mere familiarity with the word that determines the choice here, for *to* occurs more frequently in ordinary reading and writing than does *two*. Speaking generally, a substantive meaning has the preference over a transitive [1] meaning. I should have been inclined to make the statement without the reservation had it not been for the results of certain experiments that I made to verify my general impression, which was based on ordinary observation. I selected five homonyms and pronounced the sounds [2] to various classes of pupils who were instructed to write down without hesitation the word that occurred to them. I have classified the results into three groups. Group I. (representing the work of about 600 pupils) includes only pupils between nine and ten; Group II. (about

[1] See page 42.

[2] The invariable sequence of the sounds as dictated was: one, be, rain, by, to.

2500 pupils) represents the work of pupils of ages varying from eleven to fifteen, the ages being pretty evenly distributed; Group III. (close on 500 persons) gives the reactions of undergraduate students of ages ranging from 19 to 22 :—

Homonyms.	Group I.	Group II.	Group III.
	Percentage.	Percentage.	Percentage.
One	99·1	96·3	92·7
Won	·9	3·7	7·3
Be	96·6	73·6	47·1
Bee	3·4	26·4	40·0
B or b[1]	...	...	12·9
Rain	99·4	76·8	86·0
Reign	·6	22·1	11·2
Rein	...	1·1	2·8
By	96·6	69·0	52·7
Buy	1·7	25·1	38·1
Bye	1·7	5·9	9·2
Two	3·7	43·4	77·2
To	92·6	43·4	12·6
Too	3·7	13·2	10·2

Practical teachers will have little difficulty in accounting for the differences in the various groups. The little children took the point of view of the dictation lesson, and if they did happen to know any other form than the obvious one, preferred to stick to what they were quite sure of. The increase in the percentage of less-known words is quite uniform as one moves up the school, and closely

[1] Groups I. and II. had been warned that *words* were expected; this accounts for the absence of the mere letters in their case.

corresponds to the school-standing of the pupils. With those who were, from their familiarity with words and their spelling, quite free in their choice —that is Group III.—there is a steady preference for the substantive element[1] in every case but in that of *By*. It is this exceptional preference for a transitive element that made me qualify my general statement. There is nothing surprising in this preference for the substantive elements; these form the natural resting-places of thought. Besides, the other words that do not carry a substantive element depend for their meaning on some relation, and relationship is discounted in this case by the fact that the sounds are, by the conditions of the problem, presented in isolation. Accordingly non-substantive words are less likely to arise in the mind as compared with the words indicating substantive ideas and therefore carrying an environment with them.

In the case of homonyms, both of which represent substantive elements, there is a preferential background in favour of the more familiar. Thus *Rain* clearly outstrips *Reign*, and that again *Rein*. We more naturally think of a containing vessel than of an eastern potentate when we hear the sound *can* (Khan). So with the word *vessel* that has just been used; when taken by itself, its natural background is the sea.

On the other hand, with a given background we have no hesitation at all in predicting the exact sense in which a given word will be accepted. The background, then, is of fundamental importance in

[1] As a matter of fact I got a higher percentage of *Bee's* in a post-graduate class (average age twenty-three) than I did with any of the undergraduate classes; but the numbers are too small (43 *Bee's* from a class of 70 students) to permit of our drawing any satisfactory conclusion.

suggestion. Indeed, suggestion often implies nothing more than the calling up of an appropriate background. The mind does the rest for itself.

When we come to consider more exactly the nature of suggestion, we find the usual differences of opinion among psychologists. To begin with, we must keep clearly before our minds that we are concerned, not with pathological cases, but with normal healthy people. There is a wholesome naturalness that is very attractive in the view supported by Mr. W. Macdougall, that suggestion may be regarded as a direct manifestation of the mode of behaviour called "imitation." But while many educational applications may be made on this basis, we are not much helped by it in the way of Exposition. There appears to be a very general agreement among psychologists that suggestion is ultimately based upon association, and it is probable that Mr. Macdougall's view is not inconsistent with the recognition of association as a necessary part of the *development* of suggestion.

Wundt tells us that "suggestion is an association, accompanied by a concentration of consciousness on the representations engendered by the association."[1] He limits the application of the term to "only those states of consciousness excited within us which are strong enough to resist—at least for the moment—the contrary states of consciousness that tend to destroy them." When we come to educational applications of the term, we find that Professor P. Félix Thomas prefers to define it as: "The inspiration of a belief, the true grounds for which escape us, which with greater or less force tends of itself to

[1] As I do not have the German text of the *Hypnotismus u. Suggestion* by me, I quote from Keller's French translation, *Hypnotisme et Suggestion* (Alcan), p. 72.

realise itself."[1] Thomas supports this view by a reference to J. M. Guyau's definition: "The introduction of a practical belief that of itself realises itself."[2] Baldwin regards suggestion as "the tendency of a sensory or an ideal state to be followed by a motor state,"[3] and quotes Janet's formula: "a motor reaction brought about by language or perception."[4] It will be noted that this tendency towards realisation in action is very commonly implied in the use of the word suggestion; but surely it is not necessary to assume an impulse that issues in an overt act. We may surely suggest a line of thought as well as a line of action. If not, then suggestion is of very limited use to the mere expositor. Sometimes he desires his exposition to lead to a certain line of action, as we shall see in the chapter on the Story as Illustration. But it will frequently happen that he desires no more than mental activity. This, however, should satisfy the psychologists. Later in the chapter we shall work up a fuller description, but in the meantime it must be understood that by suggestion we mean the manipulation of the ideas of our pupil, so as to produce a pre-determined result whether in thought or action. For success in our work we must depend upon the Wundtian concentration of consciousness on associations.

The inspiration that leads to the concentration of consciousness may originate from within or from without. If it comes from within, we have what is commonly called auto-suggestion. It is sometimes questioned whether auto-suggestion is possible.

[1] *La Suggestion : son rôle dans l'éducation*, p. 20.
[2] *Éducation et hérédité*, p. 17.
[3] *Mental Development in the Child and the Race*, p. 105.
[4] *Automatisme psychologique*, p. 218.

The lay witness quoted on page 115 would certainly deny the possibility. For him suggestion necessarily comes from without. Professor Stout would at first sight seem to be on the same side, if we identify mental activity with the power of initiative. According to him, mental activity implies that mental process is determined purely by previous mental process.[1] But even if we cannot produce a single "bit of mental process that is determined purely from within," it does not follow that we have no power of initiation. We may never get rid of a certain residuum of stimulus from without, but all that this implies is that we are always kept in touch with the outer world, a condition that is in itself desirable. We may be able to remain open to all manner of external suggestion and yet have the power to concentrate our consciousness in the manner Wundt demands; and this concentration may fairly be said to determine the succeeding process in consciousness. Now according to Professor S. Alexander: "What I have called mental activity is, in the usual language of psychology, conation."[2] Auto-suggestion may therefore be said to occur when we will to concentrate our consciousness on certain associations. We know what those associations are, and we have a schematic knowledge of whither they are likely to lead. We may not be able to call up directly just the ideas we desire, but we can put ourselves in the most favourable situation to encounter them. We can go where certain classes of ideas are to be found, and we may have the full assurance that particular ideas of which we are at the time of beginning our quest only vaguely conscious, will by and by sort themselves out and

[1] *Analytical Psychology*, vol. i. p. 148.
[2] *Proceedings of the Aristotelian Society*, 1908, p. 222.

become focal. Probably pure auto-suggestion is a very rare phenomenon; but in any case it does not directly concern us here, for the suggestion that we are interested in is that which works from without, "foreign suggestion" as it is called by Wundt and others.

A certain confusion between auto-suggestion and foreign suggestion sometimes occurs through neglecting the point of incidence of the external influence. Sometimes this is so far removed from the point at which suggestion begins to act that the subject has forgotten all about the external force (if indeed he ever observed it as such), and regards his action or thought as self-suggested. Some writers accordingly regard the term auto-suggestion with suspicion, and one[1] at least would like to use the descriptive term pseudo-auto-suggestion, were it not so intolerably cumbersome.

A knowledge of the working of auto-suggestion may no doubt help the expositor in his preliminary examination of the mental content of his pupils. A skilful observer like Allan Poe's Dupin may be able to anticipate the developments of a mental train self-originated in another mind,[2] but as a matter of fact the expositor is interested almost exclusively in trains of thought that he has himself originated. His interest is practically confined to foreign suggestion, though it has to be remembered that the false auto-suggestion is included under this term. In fact this false auto-suggestion is by far the most effective form. It greatly increases the power of suggestion if what is really external suggestion

[1] M. W. Keatinge, *Suggestion in Education*, p. 55.

[2] Though even here the ingenious Dupin really owes his success to his power of anticipating the effects on the given mind of the various external stimuli to which he observes it to be exposed.

should appear to the pupil to be auto-suggestion. The further back we can throw the incidence of the external influence the better the results. Indeed, the root principle of the skilful use of suggestion is to make the mind of the pupil do as much of the work as possible. Why is it that suggestion is regarded as so much more dangerous in morals than direct statement or demonstration? It is because suggestion merely starts a process; the mind carries it on, and in carrying it on is apt to think that it is acting on its own initiative. There is nothing so pleasant in mental process as self-activity,[1] and if the mind can be made to feel that it is carrying out its own processes in its own way, it works with its maximum vigour. The further back the impulse from without can be thrown, the greater the chance of the pupil thinking that in a given case he is acting on his own initiative. "Husband, voter, or pupil, they willingly follow a suggestion whose origin is so well concealed that it seems to be their own."[2]

A pupil who can make no headway with a difficult rider in geometry, may be helped by the teacher bluntly suggesting that the solution of the problem lies in the demonstration of the equality of two angles CDE and RPQ which, from their position on the drawing, do not seem to have any connection with each other, and certainly do not appear to be equal. But if the teacher, by shifting about the paper on which the drawing is made, is able to place it so that the equality of the angles is likely to

[1] Compare Whately's explanation of the fact that the metaphor is more popular than the simile: "All men are more gratified at catching the resemblance for themselves than in having it pointed out to them."

[2] W. Mitchell, *Structure and Growth of the Mind*, p. 145.

strike the pupil's eye, he will set up a much more vigorous reaction than by merely stating the fact. The speaker who makes his conclusion follow immediately on the statement of two premises saves time, no doubt, but does not have the same effect upon his hearers as the man who gives one premise at one time and the other a little later, and does not give the conclusion at all, but takes it for granted, and uses it in a further development of his theme. This is the method of the successful popular lecturer, and cannot be so usefully applied in the case of difficult subjects presented to listless pupils. Even in such adverse circumstances, however, it will be found that an obvious inference is better left to the reluctant pupil. In the end, he finds it less disagreeable to draw his own obvious conclusions than to have them thrust upon him from without.

From what has gone before it will be seen that there is nothing humiliating to the pupil in being thus manipulated; for, after all, the success of the manipulation depends entirely upon the nature and content of the pupil-mind. If the pupil responds to the external stimulus, it is because the stimulus appeals to his nature. He responds to the stimulus because it has been so prepared as to respect his individuality. All the same, there is a very natural objection to a system that may be in any sense described as "Education by deception." Dr. Johnson is very angry with those who seek to manage other people in this way. Nobody likes to realise that he is managed by other people. It is true that Mr. Keatinge tells us in his book on Suggestion, that "boys like to be managed"; [1] but he certainly knows too much about boys to mean that they like to be managed in this insidious way. What he means is

[1] Page 70.

probably just the opposite. Boys like to feel that they are in the hands of a master, though this again is a little difficult to reconcile with the stress he lays upon the "contrariant" characters of the French psychologists. These characters are said to respond in the opposite sense to that suggested. In the case of rigid contrariants there is no difficulty, since all the suggester has to do is to change his suggestion from the positive to the negative, and the desired positive results will follow. With the more intelligent contrariants the attempt to use suggestion resolves itself into a trial of wits between the suggester and the subject, each trying to find out what the other really wants. It is because of the prevalence of this contrariant spirit that the incidence of the external suggestion has to be so carefully watched. Dr. Sidis, in fact, goes the length of regarding the contrariant attitude in our unhypnotised state as the normal one, and enunciates the law of human stubbornness: "normal suggestibility varies as indirect suggestion, and inversely as direct suggestion."[1]

An important consideration for the teacher is that suggestion works in only one way. It is positive, not negative. By suggestion we may cause another person to think or act in a particular way, we cannot directly cause him *not* to think or act in a particular way. The power of the little word *not* is greatly overrated by some teachers. They are apt to think it is more efficacious to say: "Don't use *non* with the imperative in Latin, use *ne*," than to say: "With the Latin imperative when we wish to signify negation we always use *ne*." What we wish to impress on the pupil's mind is that *ne* is the proper word to use under certain circumstances.

[1] *Psychology of Suggestion*, p. 89.

Accordingly we ought not to bring in the word *non* at all. With regard to conduct, the word *not* is very weak as a suggestion. In the early part of last century there was a town and gown riot in Aberdeen, and the students were not having the best of it. When they were driven within their own quadrangle and had no available weapons, the old Principal, disappointed at this result, came out of his house, and shaking his fist at the students, shouted that they must *not* pull up the palings to use as clubs. Even had the old gentleman meant the negation seriously it would have had no effect. There was only one *suggestion* in his remark, though there were two possible lines of conduct.

Moral questions are not, however, urgent in the use to be made of suggestion in Exposition. Our interest is rather in the manipulation of ideas than in the particular ideas to be manipulated. For our purpose it may be permitted to regard suggestion as a force applied from without so as to bring into action organised powers latent in the mind of another, and by utilising our knowledge of their organisation, to cause these powers to act in a direction desired by the operator. A static result is not enough. If we bring under the notice of another person some of the elements of a background that we know has previously existed in his mind, the likelihood is that this background will be thereupon reinstated. If this is all, we have an example of redintegration, and the process may not be recognised by some people as suggestion at all. It may be held that suggestion must lead to a definite line of mental *activity*, and not to a mere re-establishment of a previous state. Yet in point of fact redintegration of a background materially affects the direction of the immediately succeeding activity. A reason-

able description of the function of suggestion in Exposition is to say that it is the bringing of external influence (by means of words, signs, pictures, models, or what not) to bear upon a given mind to make it apperceive certain ideas in a way predetermined by the suggester. Since apperception is an active process, this description should meet the case.

In teaching, as opposed to education, suggestion may be regarded as the process of initiating by more or less indirect means certain mental processes that have been so organised that when once begun they are carried out automatically. It may be said to be the tapping of the forces stored up by habit, the drawing of a cheque on the paid-up mental capital. We cannot suggest a process that has never before occurred in the mind. We fail just as we have failed when we have a cheque returned to us from the bank with the legend "No funds." The crudest example of this class of didactic suggestion is to be found in the blunt giving of a few words that form part of the desired answer. Plain prompting is a kind of suggestion. Teachers sometimes adopt a sort of disguised prompting that seems to give them satisfaction by saving them from the disgrace of having to tell something that they feel in honour bound to elicit. The pupils in one case could not be persuaded to answer the question "Which English statesman was responsible for the loss of the American colonies?" The teacher encouraged them by telling them that they knew quite well if they would only think. They thought; but without success. At last the teacher had an inspiration, and asked "What is the opposite of south?" She was rewarded with the unanimous reply, "Lord North."[1]

[1] At a drawing-room meeting of a branch of the Parents' National Education Union, a very distinguished London physician

The teacher must not lose sight of the fact that, in addition to the deliberate and accidental suggestions of the moment, there are certain general lines of suggestion that work in a more permanent way. Most of these are what medical men would call benevolent, but some are malignant and deserve special attention. It is a desirable thing that when certain ideas are recalled there should at once arise by suggestion certain of the important elements implied in the connotation of these ideas. But if only trivial elements are suggested, there arises the danger of a false conception of the idea as a whole. The following extract from a clever novel[1] of journalistic and artistic life well illustrates this permanent suggestion of superficial elements. The scene is a publishing office, and Mildmay, the art editor, is discussing with Martin, the literary editor, the illustrations submitted for an Egyptian story in a magazine. Martin begins:

"Where's the Sphinx?"

"Not mentioned in copy," said Mildmay, moving a little farther behind Martin's chair.

"Where are the Pyramids?"

"The story contains no reference to the Pyramids," said Mildmay quietly.

"But—but—but—you know better than *that*, Mildmay!" the editor protested, shocked and trembling.

. . . . . .

"But—but—my dear chap! Here's a story about Egypt, and not so much as a Sphinx or a Pyramid or anything at all to suggest Egypt in it."

"The chap who drew that, Martin, was on the *Condor*, and at Kassassin and Tel-el-Kebir."

"Then he ought to know better than to send us a drawing like *this*."

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maintained that he saw nothing wrong with this example of the use of suggestion. On the contrary, he believed it to be an excellent illustration, and a capital way of bringing the young people to the point. So hard is it to be efficient in two professions.

[1] *Little Devil Doubt*, by Oliver Onions, p. 290.

An example of the most malignant form of the permanent suggestion is to be found in the denominators of vulgar fractions. These have a peculiarity that is often disconcerting. They carry over to their fractional functions the associations of their integer connections, with the result that they suggest false estimates of the values of fractions. Some highly intelligent adults suffer from this permanent *suggestio falsi*. Most of us have come across men who believed that their club was more select than another, because it was necessary to have only a fifth of the balls black before rejection followed, while in the other club it required a tenth.

Underlying the idea of percentage is the permanent suggestion of considerable numbers. Not infrequently illustrations in percentages convey a false impression on this account — not always unintentionally. Unscrupulous persons quote the actual figures in all cases where they are large and imposing, and when they are unpleasantly small, represent them by percentages. Grave injustice is sometimes done by the necessity of expressing certain official returns in a uniform way. A teacher finds, for example, that his ex-seventh standard is listed as having 100 per cent of failures. This reads like a complete breakdown of the school, whereas all that it means is the complete breakdown of dull John Smith, who happens to constitute the whole of the ex-seventh standard for that year. Wherever the numbers concerned are very small, the permanent suggestion should be corrected by a statement of the actual figures.

The following quatrain from Béranger's *Les Gueux* proved unexpectedly difficult in an examination in French :—

Vous qu'afflige la détresse,
Croyez que plus d'un héros,
Dans le soulier qui le blesse,
Peut regretter ses sabots.

On investigation I found that the cause of the trouble was the force of the permanent suggestion of the word *un*. Though the pupils all knew, of course, that the word could mean *one* as well as *a* or *an*, the suggestion of an article before a noun was so overpowering that most of them had to make the best they could of the article-sense, and as a consequence they rang the variations on "more of a hero." A similar suggestion played havoc with a class called upon to read at sight a passage which they had not before seen from the Twelfth Book of the *Æneid*:

Ardentes oculorum orbes ad moenia torsit
Turbidus, eque rotis magnam respexit ad urbem.

Since the class had never encountered the enclitic *que* in this collocation with *e*, the horse suggestion was overmastering, supported as it was by the accompanying *rotis*. The majority of the pupils more or less ingeniously apostrophised a hypothetical horse.

It sometimes occurs that relative terms acquire a permanent suggestiveness that leads to error. Towns on the east coast acquire a suggestion of easterliness. Most people, for example, who have not had their attention specially called to the matter, are under the impression that Edinburgh is farther east than Liverpool, which does not happen to be true. The general easterly flow of the Thames sometimes causes confusion of the points of the compass in the minds of people crossing Westminster Bridge. The expositor must be

continually on his guard against these permanent suggestions.

We have seen that the range of suggestion is limited to the mental content of the pupil. We can suggest to him new combinations of old elements of experience; but we cannot suggest new experience. Further, we may be quite aware of the mental content of the pupil and yet be unsuccessful in suggesting the proper ideas. We are familiar with the story of the Englishman who, in France, did not know the word for mushrooms, but made a sketch of one, and had the mortification of being offered an umbrella. Palæographers tell us that the early iconographs and ideographs are exceedingly suggestive. But when tested by application to modern pupils it is not found that they make the proper suggestion. The accompanying two drawings



FIG. 1.

are reproductions of early Chinese iconographs. They are merely different ways of representing the same thing. But though the pupil has thus a double chance, it becomes clear on making the experiment with a class, that none of the pupils can guess what the drawings ought to suggest. Yet the palæographer tells us that this is regarded as "an exceedingly clever abbreviation of a pictorial representation of flame."[1] The following are regarded also as particularly suggestive, but to

[1] M. J. B. Silvestre, *Paléographie universelle.*

English pupils at any rate they have proved quite unintelligible :—

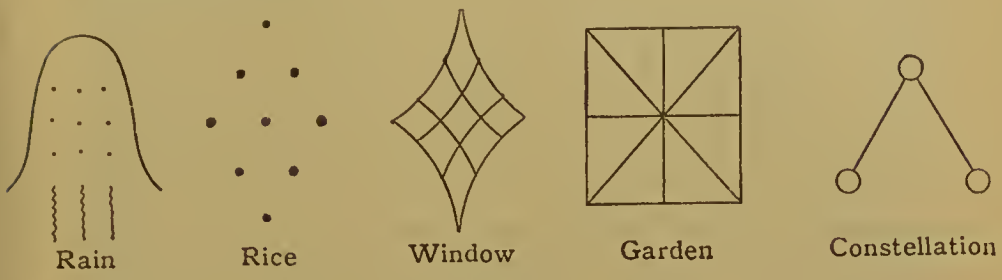


FIG. 2.

Accompanied by the interpretation, all these iconographs are intelligible enough, and the symbolism is quite apparent, but in themselves they suggest nothing. With the two following drawings as they stand



FIG. 3.

I had no success whatever in eliciting the meaning from a class of intelligent students of average age twenty-two. But when the help was given that they represented male human beings who stood in a certain family relationship to one another, and that the silhouettes were taken from early Chinese writing, nearly half of the class were able to respond to the suggestion, and declared them to be father and son ; the suppliant attitude of the son and the protecting attitude of the father being quite what one would expect in view of what one hears of the filial relation in China.

A similar difficulty in applying suggestion is experienced in attempting to reproduce in graphic form certain states of mind. No doubt Sir Charles Bell[1] and others have succeeded in representing very faithfully some of the stronger emotions. But unobservant people frequently misunderstand excellent graphic presentations of human facial expression, and when we deal with less skilful presentations even intelligent readers do not always respond successfully to the suggestions offered. M. Maurice Castellar, in illustrating the practical side of expression, gives nine photographs of persons whose attitudes and facial expressions are supposed to indicate certain states of mind that are set forth in the explanatory letterpress that accompanies them in his book.[2] There are in all seventeen individual figures, and in only four of these did an intelligent class of students hit upon the state of mind that was described in the explanatory letterpress. Still, when the letterpress was read, the students were willing to admit that the photographs might be said to represent quite well what was wanted.

In the use of suggestion it is obviously of importance to discover the least possible amount of energy to be used to produce a given effect. We must seek out the *minimum suggestibile*. It is sometimes discussed how much of a given complex must be presented before the whole is suggested to the mind. There can be no quantitative answer. We have no standard. Everything depends upon our familiarity with the complex in question. The case is sometimes put, how much of the stag must appear above the crest of the hill before the hunter

[1] *Anatomy of Expression in Painting* (1806).
[2] *L'Art de l'orateur*, Paris, 1906.

is certain that he is dealing with a stag? Clearly it all depends on the hunter. There are some hunters who would require to see pretty nearly the whole animal before they would be certain, while others respond to suggestion at the first appearance of the tip of the antlers.

With an object for which we are not prepared (the stag-hunter is assumed to have been waiting for a stag) we cannot say which element it is that suggests the complex. It does not come to us piecemeal, but as a whole. Going along a crowded street, we find ourselves thinking of a certain friend. Suddenly we become conscious that there he is a few steps in front of us. The thought of him has been suggested to us by the appeal of some of his physical qualities. If we are asked how we knew it was he from the mere appearance of his back, we find it difficult to say, and what we say, remember, is pure theory. The fact that it is we who have seen and recognised the man gives our evidence no more authority than that of any one else; for the recognition was not made deliberately. Very probably the peculiarities that we select as distinguishing our friend had little to do with our recognition. We did not observe this thing and that, then reason out that it must be So-and-so; So-and-so sprang ready-made into our consciousness.[1]

The fact seems to be that if the different elements of a complex are firmly welded together, that complex can be suggested only as a whole. If we wish to recall the idea of a cow to the mind of another, we can do so by appealing to various senses, but so soon as the cow appears she appears as a

[1] For a very ingenious theory that does not agree with the above, see Dr. W. T. Harris's *Psychologic Foundations of Education*, chaps. ix. and x.

whole; it is not a matter of one part appearing and being followed by another. Further, the cow that does appear is always the same cow for the same mind. We have all only one available cow as idea. This idea may be aroused at any moment by the sight of the word *cow*, or by the pronunciation of that word, or by the lowing of some unseen animal, or by the peculiar odour that we associate with cow-sheds, or by the sound of a peculiar kind of bell. However aroused, the resulting idea of cow in our mind is the same, if it be allowed to develop to its full extent. The preferred sense will no doubt have its effect in the setting in which the cow will be found, but the cow itself will be the same, however recalled. To be sure, this ideal cow is capable of improvement. Increasing experience of cows gives the idea greater content. But such a change is gradual. It remains true that for a given stage the available mental cow is constant for the individual. For suggestion this is the only cow. Changes can be effected only by supplying information.

The question is sometimes raised whether we are morally justified in using suggestion in such a way that the person operated on does not know that suggestion is being used. Note that stress is laid on the fact that the person affected is not aware that he is the subject of suggestion. But, as a matter of fact, if the person knows that suggestion is being used, it is no longer a case of suggestion. If we openly advise a man to follow a particular line of conduct, we may be said in a certain sense to make suggestions. We may even put our advice in the very form of "Well, I would suggest—" But this is a very different process from that we have been considering in this chapter. The problem

of the sanction of suggestion *solvitur ambulando.* Whether we will or no we are continually using suggestion in the sense in which we understand it here. It is true that we may use it sometimes more, sometimes less, deliberately. But even so, the problem has to be carried a step farther back before it is worth discussing. Not the use of suggestion, but the preparing the mind for suggestion is the responsible work. Suggestion is powerless to do anything but set in motion forces that are latent but none the less existent. The sight of means to do ill deeds makes ill deeds done, only when the ill deeds are already within the mental content of the person tempted. Suggestion is powerful only in so far as it follows the laws and takes account of the content of the mind operated upon. This is the psychological explanation of the saying that to the pure all things are pure. No amount of suggestion can evoke from the mind ideas that are not there.

Still it cannot be denied that suggestion is capable of illegitimate applications. It is significant that the word is only now emerging from a very discreditable association in the dictionary, and even still the adjective *suggestive* connotes a special and particularly vile class of things to be suggested. But the fact that the process is recognised as pre-eminently dangerous is only an argument the more for the educator seizing this specially powerful means of influencing his pupils. If it can so easily lead pupils wrong, it is surely our duty to learn how to use it on the side of right. There is no reason why evil should monopolise suggestion.

From the moral standpoint the purpose of education is really to make the pupil suggestible to certain influences. The good boy is the boy who

responds to suggestion in the way that his teacher regards as right. In intellectual instruction the same may be said. The boy who knows a subject really well is the boy who can be depended upon to respond loyally to suggestion in that subject. Suggestion while a valuable means of Exposition is also in itself one of the goals of intellectual education.

CHAPTER VI

CONDITIONS OF PRESENTATION

PRESENTATION is one of the Five Formal Steps that are now the common property of all who deal with method in teaching.

The very name Formal Steps implies two underlying assumptions. It takes for granted, in the first place, that it is possible to separate form from matter in teaching. One may be a little surprised to find in these steps that originated with Herbart this emphasis on the formal side. The usual criticism against him and his followers is that they attach undue importance to the nature of the matter to be presented to the pupil. According to them, a man is what he is because he knows what he knows.[1] When we find, then, that the Herbartians commit themselves to form at all, we may take it for certain that the matter to be taught is not neglected. The formal steps are a statement of the process of teaching with the minimum reference to the nature of the matter to be taught. We can never entirely eliminate consideration of the subject-matter of instruction, but in the formal steps it is maintained that the separation of form

[1] See Dr. F. H. Hayward's writings *passim*; but especially *The Secret of Herbart.*

and matter has been carried to the ultimate point. By following these steps it is claimed that the teacher will best guide the pupil in the process of learning, and that with the minimum consideration of the nature of the matter to be learned.

The second assumption is that instruction should proceed by definite steps. Comenius warns us with some energy, and not a little repetition, that nature never proceeds by leaps, but always by steps. The Herbartians have taken this warning to heart, and have systematised the steps in teaching that they believe nature would have us follow. We must not confound the need for stepwise progression with the speed with which progress is accomplished. Whatever nature may do, children certainly sometimes appear to proceed by leaps in their thinking. We often accuse them of jumping to conclusions. But this does not show that they have not proceeded stepwise, unless by stepwise we mean that every step must be deliberately taken. The fact that I go upstairs three steps at a time does not prove that I am not going upstairs. I proceed stepwise though I do not take every individual step that I might. The clever pupil may pass over many steps that the teacher may feel called upon to deal with in class, and the stupid pupil frequently requires additional steps to be interpolated between what may be regarded as the normal steps; but both kinds of pupil are proceeding along in the same direction, covering the same course, though the one has to touch the ground much more frequently than does the other. The number of steps to be taken is one question—and in itself a very important one, particularly in relation to class-work—the order in which these steps have to be taken is another. It is mainly with the order

of the steps that the Herbartians deal when they speak of the Formal Steps.

As a matter of fact, Herbart does not speak of steps at all, but of "modes of teaching." Of these modes there are four, named respectively: Clearness, Association, System, Method.[1] These names are not very suitable as descriptions of processes, so later writers have introduced certain changes. The first step, that which leads to clearness in the pupil's mind, is really made up of two processes, and may therefore be regarded as a double step. The first of these processes consists of analysis; the contents of the pupil's mind must be analysed so that he may be prepared to receive the new matter. The second consists in a synthesis of the new matter with the old. The analytical step has been named preparation, and the synthetic presentation. It may not be amiss here to emphasise the fact that preparation in this sense means preparation of the pupil's mind, not the teacher's. There has been a good deal of discussion about the naming of the different steps. Probably the most widely accepted nomenclature of the five steps now generally recognised is: Preparation, Presentation, Association, Generalisation, and Application.[2]

It is sometimes held that in the first two steps we are working on the perceptual plane. Certain elements of our past experience have been combined with certain new elements; but that is all. The new wholes thus formed are yet mere units, though they are in themselves complex. They must now be brought into relation with other

[1] *Allgemeine Pädagogik*, 2. Buch I Kap. II.

[2] For a tabular presentation of the various classifications of the Steps by the followers of Herbart, see page 139 of Charles de Garmo's *Herbart* in the "Great Educators Series."

wholes. At this stage we are not very particular which other simple or complex units they are brought into relation with. What we want is to bring the new unit into relation with as many other units as we have at our disposal. To bring this about, the best means is easy discussion, not in the sense of argument, but rather in that of free conversation. The teacher can work up the association of a subject in different ways. He may suggest as many similar ideas as he can, and thus encourage comparison, with a view to bring out resemblances. Or he may call up as many contrary ideas as the experience of his pupils supplies, and thus lead to arrest by force of contrast within the same field. Or he may change the point of view from which the newly presented ideas are to be viewed, and thus show them up against different backgrounds. The purpose of this third formal step—called *Association*—is to find the true place of the new combination in the nature of things as represented by the present content of the mind in question. The associations formed at this stage may be of a purely accidental character. Naturally most of the ideas with which the newly acquired elements are compared or contrasted have something in common. But in turning over ideas in the mind, combinations of purely disparate ideas must frequently be formed. The complexes thus formed are at this stage not of primary consequence, though they should all be able to bear the test of comparison with an objective standard. What is at present aimed at is the familiarising of the new elements with their surroundings in the mind.

The next step, called *Generalisation*, goes further. Like association, it implies the grouping together of the elements of experience, but this time the

grouping is no longer a matter of chance or arbitrary choice. We have to advance from mere grouping to system. Association supplies us with the materials for forming concepts, but it is the work of the Generalisation step to develop the concept. This is why the step is variously named System, Concentration, and Generalisation. Underlying each of the elements joined together at the step of Association there is a deeper meaning than appears at the first casual glance. At the associational stage we regard this chair and that as self-existing objects. They are no doubt related to other objects inasmuch as they all co-exist in time and space. But the essential oneness of all chairs is really perceived at quite an early stage. The child behaves intelligently towards a chair that he has not seen before if he has already had dealings with one or two chairs, or even with only one, if the new chair is not too unlike the first. But he does not realise this oneness till he has had it brought to consciousness by a process of generalisation. The process of generalisation is apparently a very complicated one, and when we reflect that it implies as a necessary preliminary the process of abstraction, we seem to have ruled it out of court altogether so far as young pupils are concerned. But as a matter of fact it is not necessary to go through the complete process of philosophical generalisation in the junior schoolroom. Without, of course, knowing of the existence of such a thing as the self-conscious level, the very youngest pupils generalise with ease. It is indeed the fatal ease with which they generalise that calls for such careful treatment. It is not the difficulty in getting them to generalise that need concern the teacher, but the difficulty of preventing

them from generalising wildly. Children begin to generalise in their nurse's arms. When a child calls a cat a bow-wow, or a dog a pussy, we say he generalises rashly. As a matter of fact, he is guilty of an undistributed middle. But the appeal to reason at this stage is out of the question. Not reasoning is wanted but experience.

To avoid rash generalisations the association step must be carefully made. Ordinary experience secures that in the great majority of cases the association step is sufficiently elaborated to prevent at least such rash generalisations as are dangerous. In actual teaching, the association step can be so manipulated as to meet the special needs of the generalisation about to be made in the next step. For instance, if the teacher is afraid that the pupils are likely to fall into Sir Thomas Browne's rash generalisation and maintain that no quadruped lays eggs, the conversation at the association stage may be directed to frogs, crocodiles, and such troublesome exceptions to an otherwise unobjectionable generalisation. The value of the conversational method lies in the fact that it turns attention in a great variety of directions, and thus brings forward collocations of facts that produce healthy contradictions and prevent generalisations that otherwise might have passed muster. The greater the knowledge the teacher possesses of the content of the minds of his pupils, the more effectively can he direct the course of the association step. But even with the best informed teacher there must always remain a vast unexplored region of the pupil-mind which can be best dealt with by the free course of conversation.

Once the generalisation has been obtained, there is room for ingenuity in the way of fixing it in

the memory of the pupils. The apt phrase, the epigrammatic definition, the broad general rule are all here in place. Even the moral, if well expressed, may have its claims recognised, on the condition that it has been worked for by the pupil. When once the moral has been worked for and expressed in the pupil's blundering language, there can be no harm in translating his halting sentences into crisp English.

The final step is named *Application*. We must not rest content with imparting facts, correlating them with facts already known, and deducing from them the underlying meaning. They remain dead and useless till they are applied in actual life. It is one thing to know; it is quite another to be able to use knowledge. A very useful classification of our pupils may be made on this point. There are those who have much more knowledge than they can make use of, and those who could make use of much more knowledge if they had it. We are familiar in school, and perhaps more familiar still in ordinary life, with the person that can make a little knowledge go a very long way, and also with the person that is full of knowledge and cannot make any use of it. A good method of Exposition must do something towards bringing these two extremes together. The earlier of the formal steps provide the knowledge in the best form; the final step sees that this knowledge gets a field on which it can be exercised.

It is quite possible for pupils to have a piece of knowledge without being at all able to use it. In several hundred classes I have held up a six-inch fountain pen and invited the pupils to tell me how long a half of three-quarters of it was. I had but a small percentage of correct answers. Yet

the moment the problem was stated on the blackboard as "Find the value of one-half of three-fourths of six inches?" most of the pupils were indignant at being asked such an easy one.[1] This final step, then, is the place for exercises of all kinds. Till the pupil has applied his knowledge in some way, it is not really knowledge to him. It is something inert, dead, useless. When the application step has been completed, the knowledge is living; fact has been turned into faculty. This may not unfitly be described as the aim of the whole series of formal steps. They have served their purpose if they have so presented and manipulated the facts that they have become faculty.

Two common lines of error in the application of these Formal Steps have done much to diminish their usefulness.

In the first place, there is a tendency among the more matter-of-fact teachers, those who are just a little above the rule of thumb, to emphasise unduly the second step. To such ultra-practical teachers Presentation is the only step that need be seriously considered. It is the one bright gleam of light in an otherwise dark system. To present new ideas to the pupil's mind: *that* is teaching. All the other steps are more or less pedantic refinements, but Presentation is something real, something that commends itself to a man of common-sense. Yet as a matter of fact complete Presentation is possible only in so far as all the other steps are taken. It may seem trifling to say that the mind can accept only what it has been prepared for; but the constant neglect

[1] As illustrating the power of the mere form of expression, it is interesting to note that I got somewhat better results when I asked for *one* half, than I did when I asked for *a* half.

of this commonplace is the cause of much unsuccessful teaching. The practical teacher is right in seizing upon Presentation as being the most important of the five. It may not unreasonably be maintained that the whole five steps are only different aspects of Presentation in its wide sense. But we must not confuse a special aspect of Presentation separated off from the others and labelled the second step, with Presentation as a name for the whole process that cannot be completed without the whole five steps.

The view that all teaching resolves itself into the direct giving of information, the telling the pupil something new, has produced a natural reaction which leads to error in the application of Presentation, or rather by the elimination of Presentation. From their studies in theory young teachers are inclined to avoid anything in the form of direct Presentation. The second step, while still monopolising their attention, is regarded with suspicion. What is contemptuously called "telling" is regarded by these young teachers as in the highest degree unintelligent and unscientific, and they fall into ludicrous errors in their efforts to avoid it. Everything must be, in the words of their text-books, "elicited from the pupil by skilful questioning." They do not realise that there are two kinds of knowledge: one that must be communicated directly, and another that may be worked up from materials already in the mind. We want very badly a couple of words to keep these two kinds of knowledge from getting mixed. I cast covetous eyes on the two words *information* and *instruction*. The first would very well represent the communication of new facts; the second might stand for the rearrangement of facts that are already

known to the pupil-mind in one way, but that by being recombined may produce knowledge that was latent, if you like, but that certainly would never have come to light at that stage, but for the intermediation of the teacher. It is information to tell me the Japanese word for a tree. If I do not happen to know the word, no amount of skilful questioning will ever elicit it from me. On the other hand, the generalised formulæ of Euler's Theorem [1] may be said to be implicit in the pupil's mind before he approaches the problem. All the teacher has to do is to arrange that certain ideas shall be grouped in a particular way, and the formulæ issue of themselves. The meaning of *instruere* that our dealings with Cæsar have familiarised us with, comes in very appositely here. The general draws up the line of battle, now making one formation, now another. In every case the men, like the ideas, are given. Information is as different from Instruction as recruiting is from drilling.

The second error in the application of the Formal Steps is just the opposite of what we have been considering. Instead of being tempted to overestimate one of the Steps and neglect the others, the teacher may be impelled to insist too rigidly on the individual rights of each step—in other words, to insist pedantically on the Steps, the whole of the Steps, and nothing but the Steps. For long, students in training colleges arranged their notes of lessons in three columns, at the top of which stood the words *Heads*, *Matter*, *Method*, respectively. The Formal Steps came along, and introduced a welcome elasticity into the form of note-making. Unfortunately the new system is

[1] See p. 33.

rapidly settling down into the old rigidity. The student first of all makes the mistake that every lesson must exemplify the whole of the Steps, forgetting that the teaching-unit does not necessarily coincide with the lesson-unit. It may take several lessons to complete the cycle of the Steps in respect of some important section of a subject. Besides, all the Steps are not always of the same importance. Particularly the two steps Association and Generalisation have very different values according to circumstances. It is no uncommon experience to find a student coming to her Mistress of Method with the distressing news that she "simply can't get a generalisation for this lesson." As a matter of fact, the one important thing is that a subject should be so presented that when the lesson is over the new matter shall have been worked up into the very warp and woof of the mental content of the pupils. In the process the Formal Steps give very useful guidance, but that guidance must be of a general kind. Application, for example, need not be kept entirely to the end of the process. Frequently it comes in very appositely along with association. Sometimes generalisation may force itself in before association has had time to complete its work, and sometimes there may be no need of generalisation at all. The Steps meet the case of the normal mind under normal conditions, but they have been formed on experience of how the mind acts, and are not something above the mind, and therefore something that the mind must obey. Most people who have had to do with the training of teachers have had experience of the complaint expressed to a class that is answering ahead of what the teacher's notes arranged for: "But you don't know that *yet*." This means that the pupils

have anticipated what, according to the teacher's calculations, is not due for several questions yet. In such cases it may still be desirable, for the sake of the duller members of the class, that the teacher should insist on going through what he had intended. But he must realise that there is no absolutely fixed rate at which pupils learn.

All the same, it is not a matter of indifference in what order facts are presented to the pupils. Old facts that have to be recalled, and new facts that have to be presented, cannot be put forward haphazard. It may be impossible to lay down any fixed law according to which presentation must always be made, for sometimes one fact and sometimes another may be the best to bring forward first. Everything depends upon the mental content of the pupil and the purpose the teacher has in view at the time. It is conceivable that the same matter might have to be presented by the teacher in quite a different order to the same class according as the lesson is to be given at the beginning, the middle, or the end of a given session. Indeed, so important is this question of order that as soon as we have dealt with some other of the conditions of presentation, we shall devote a couple of chapters to it.

One of the most popular problems in examination papers for teachers is to work out the relation between the inductive and the deductive methods of teaching. The orthodox answer seems to be that we should begin with the inductive and end with the deductive. But obviously the two methods cannot be dissociated in a wholesale way. No doubt, in dealing with a particular part of a subject one method or the other has the preference, but when we view the field of school work as a whole

we find that there is a place for both all through the pupil's course. Speaking generally, new matter is acquired by inductive methods and applied by deductive. But in the application by means of deductive methods we put ourselves in the way of learning at least some new matter, as well as establishing what we have already mastered. It is not that we are inductive at the beginnings of our subjects and deductive later on. The two processes interlace even at the beginning. Some law must be laid down, some datum given even at the start. Thus in making a beginning of the teaching of Latin we may either give a few rules of construction and a few Latin words with their meanings, and set our pupils to read a bit of Latin. Or we may give our pupils a bit of Latin and tell them its general meaning, then set them to find out the meaning of the individual words, and to learn the meaning of case, number, person, and what not from their experience of the way in which words behave in Latin passages. The first method would be generally described as deductive, the second as inductive.[1] Obviously there are inductive and deductive elements in both. The alternation between the two methods characterises the whole course by which the boy acquires a mastery over his subject.

This alternation of the different methods is paralleled by a different form of rhythm that is characteristic of Exposition. This is the alternation between the concentration beat and the diffusion beat. Viewed from the standpoint of psychology, this is usually regarded as the rhythm of attention. But it is not a matter merely of greater and less

[1] For the Inductive Method in Latin teaching see Bennett and Bristol's *The Teaching of Latin and Greek*, p. 80 ff.

attention, but rather a change in the area of the field within which attention is distributed. There is a tendency among teachers to confound intensity of attention with the narrowness of the range within which it is exercised. A pupil may attend as intently to a wide field that he has under observation as he does in concentrating his attention on the tip of a blade of grass in that field. In practice it is found that there is need for continual change of what may be called the focus of attention, and of this changing focus the expositor must take careful heed. Microscopic work affords us a useful parallel. The observer usually begins by using the low power, say 70, to get a general idea of the specimen under examination. By and by he wants to get a more detailed view of some part. Accordingly he uses a higher power and turns on perhaps the 350 objective. Some part of the new field he desires to examine in still further detail, and in consequence he uses the 700 objective. But while working with these high powers he begins to get a distorted view of the object as a whole, and to correct this he returns to the lowest power of all. It is because of this need for continual change from one power to another that the double nozzle and the multiple nozzle are supplied to microscopes, so that with the minimum outlay of time the field of vision may be changed according to the degree of detail the observer desires.

In Exposition we are continually changing our focus, and there is a certain danger that the expositor's focus may change without a corresponding change on the part of the pupil. The expositor may be working with the 700 objective, while the pupil is working with the 70. The tendency in Exposition as in microscopic work is to use the

higher powers too freely, or rather too frequently without reference to the low powers. It is natural to suppose that the higher the power the more the pupil will learn. There is the misleading "permanent suggestion"[1] of the word *thorough*. To know a thing thoroughly is generally understood to mean to know it in great detail. But it is not unusual to find a person who knows a subject in great detail and yet has no command over that subject, because he has not correlated the details to the broad general principles. In Exposition the teacher must concentrate now on this point, now on that; but he must never fail to correlate the minute points of the concentration beat with the broad outlines of the diffusion beat. He must learn from the painter who goes close up to his canvas to peer into it and put in a delicate stroke or two, only to step back a few paces so as to get the general effect. The painter is attending as keenly at the long range as he is at the short one, and doing quite as valuable work.

It is obviously of the first importance that expositor and pupil should be at each moment working with the same power. This is sometimes secured by the expositor making use of certain conventional expressions such as "speaking very generally," "taking a wider view we find," "coming now to details we see." Apart from specific verbal cautions, the best way to maintain identity of power is to use the material in such a way as to lead to difficulties if it is presented along with material that belongs to a different grade. This may be best illustrated by the case of History, where we have the possibility of a geographical background. Besides, we are able, by the kind of characters we

[1] See p. 133.

introduce, to indicate the general scope of our exposition. We may have half a dozen historical manuals all of the same size yet dealing with widely different fields of history. We may have one dealing with Ancient History; another with the History of the United States; a third may be an Epitome of the History of the World; while a fourth is the History of Partney Parish. We have here four quite different powers, and while a certain number of events are common to two or more of the volumes, the importance of these events is entirely different in the various volumes. The Renaissance might be treated in four different powers at different times with the same advanced class. Under the 70 objective we might treat of the great movement that north of the Alps culminated in the Reformation, and on the south of the Alps in Humanism. The 200 objective would give scope for a lesson on the statement that "Modern History begins with the reign of Henry VII." Under the 500 objective there would be enough detail to work out the Effect of the Renaissance on the Public Schools of England. "The Renaissance is epitomised in Erasmus" would be a theme that could be satisfactorily treated only under the 1000 power object glass.

This sliding scale of focus emphasises the relativity of everything that can be said on the subject of Exposition. There is a natural desire for a standard of some sort to which different cases may be referred. The ordinary thermometer with its two fixed points of departure—the freezing and boiling points of water—rouses our envy and challenges competition. In attempting to set up two points as a basis of comparison in Exposition, it must be remembered that we are working on the subjective side, and

that therefore the points will vary with each individual treated. It is comparatively easy to standardise the expositandum, the matter of exposition, but so soon as we enter upon the subjective consideration of that matter we must be prepared for difficulties; we must face the problem of the individual mind.

It is possible to obtain two points that are fixed for any given individual at a given time. They change in the course of the pupil's development, and they do not coincide exactly in the case of different pupils at approximately the same stage of development. But they are fairly definite within the experience of the individual, and the coincidence with corresponding points in pupils of the same standing is sufficient to give the points a certain practical value.

The first may be called the Inference Point. It marks the stage in any given subject at which the pupil has to go through a process of inference, however slight. Up to this point everything in that subject that is presented to the pupil is accepted at its face value. If on glancing at the sky a man remarks, "I see it is going to be a fine day to-morrow," he is dealing with a matter that is below his Inference Point. No doubt he is really making an inference and not merely recording an observation. He does not see that it is going to be a fine day, but from what he sees he infers that the day is going to be fine. So closely related, however, are the facts observed and the deduction drawn from them, that the whole process is practically one. When a number of facts and deductions from facts are so welded together as to become independent organised groups, the mind requires merely to observe them in order to accept them as wholes

without criticism. Wherever this happens, the mind in question is working below its Inference Point. But when the Inference Point has been reached, it is necessary to do conscious work. Ideas have to be compared and correlated, and deliberate deductions drawn from previous experience. A medical student at a clinical examination is working well above his Inference Point. The case may be an easy one, but the student is quite aware of the processes by which he reaches his conclusions. A mere glance at the patient tells the *examiner* all that it is necessary to know. The few perceptual impressions that act on the examiner's mind call up at once certain groups of ideas with which they have become in his mind so closely associated as to form one whole, which represents the disease from which the patient is suffering. Obviously the Inference Point in a given subject which the student is studying is continually rising. What he has to reason out painfully at the earlier stages becomes a part of his being. As soon as a fact becomes faculty, it falls below the Inference Point. With growing experience, fact after fact takes its place in complexes that remain below this point. The number of groups of ideas that may be accepted at their face value is always increasing.

Botanists tell us that at the tip of each twig there is what they call "the growing point." The plant as a whole increases by the multiplication of cells according to their special fashions, by budding, fission, gemmation, or what not. But in whatever way they multiply they always produce cells of exactly the same kind. Sap cells produce sap cells and no other kind, bast cells other bast cells, wood cells other wood cells,

and so on all round—except at the growing point. There the cells are undifferentiated and multiply so as to produce cells that are fitted to become at need sap cells, or cambium cells, or bast cells, or whatever other kind the plant stands specially in need of at the time. The range above the Inference Point corresponds to the growing point of the plant, is indeed the growing point of the mind. It is in this region that the nurture of the mind takes place.

It would seem as if there could be no limit to the region within which inference, conscious inference, is exercised. But there is an upper limit to the region of Inference when the matter is considered from the point of view of teaching and learning. The Inference Point marks the limit of paid-up mental capital. All the matter that lies below it may be called upon at a moment's notice, with the full assurance that it will come at once and behave as it is expected to behave. It is organised almost to the automatic level. Above the Inference Point the matter on which the mind acts is still organised, though the organisation is less complete. In certain directions the organisation is more and more to seek, and a stage finally comes at which the subject cannot be said to be organised at all. When this stage has been reached in a given subject, we may be said to have attained the Gaping Point. It indicates the limit of organisation of the mental content. Up to this point everything is dealt with under definite categories. The mind is prepared to manipulate the matter in certain definite ways; it puts certain standard questions and knows how to deal with the answers. If, however, some matter is presented that the mind does not know at all how to deal with, the

Gaping Point has been reached. All that the mind can do is to turn over this new matter in various ways, look at it from this point and from that, in fact, gape at it.

A mineralogist has a new substance presented to him for examination. It is not sufficiently characteristic to be at once classified by inspection. Accordingly it rises above the Inference Point. He proceeds to apply this test and that according to his system. He observes its colour, its crystalline form, and its general texture. He strikes it with his hammer to hear how it rings. He breaks off a piece to discover its fracture. He pounds a small portion to get the colour of the powder. He tests its hardness compared with his standard minerals. Then he goes to his laboratory and discovers its specific gravity, its chemical composition, its reaction to heat, electricity, and other things. All this while he has kept on asking certain definite questions. He knows exactly the sort of information he wants. His examination has been guided by previous experience, and therefore admits of experiment. If now, in consequence of his investigations, he finds that not only does the result not fit into any system of classification with which he is acquainted, but that several of his individual results contradict each other, he has come very near the Gaping Point. It remains for him to consult his books and his friends. If as the result he finds that the mineral remains a mystery, he has actually reached the Gaping Point; for not only does he not understand the mineral, but he does not know how to go about discovering its meaning.

Every one who has had experience in working riders in geometry has had experience of the

Gaping Point. At first we treat the problem in certain definite ways dictated by previous experience. This proposition and that will be applied. But if after a time everything we know has been applied in vain, all that can be done is to gape at the problem, and wonder whether anything will turn up to suggest new lines of investigation. We look at our drawing upside down, sideways, obliquely, any way that may enable us to surprise the hidden meaning; just as we do in that typical case when we are reduced to the Gaping Point by the very bad handwriting of a friend.

Like the Inference Point, the Gaping Point is not stationary. After many illegible letters from our friend we begin to know that certain tiny scratches mean *the*; that a particular wriggle always means *ing*, another wriggle *ation*, and a third *ly*; that what looks like *e* is always *a*; and that *of* is always omitted. Out of this we form a system by means of which we can proceed scientifically to deal with the body of the letter, though probably at the end there will be a small portion still left at the Gaping Point.

But if it is important to remember that our Inference and Gaping Points are continually changing, it is much more important to realise that our pupils' Points are quite different from ours. What is below the teacher's Inference Point is often at the pupil's Gaping Point. No better way of testing a teacher's skill in manipulating the two Points could be found than an examination of the use he makes of the word *therefore*. With matter below the Inference Point of his pupils the teacher is entitled to bring his *therefores* closely together, but in subjects within the pupils' Inference zone the teacher should see that a good deal of matter is

placed between each *therefore*. We have all met the brilliant mathematician who puts down one line of algebraic symbols on the board, immediately followed by another, the only bridge from the one to the other being this aggravating word. Sometimes it takes pages of close working before a pupil contrives to bridge the gulf that his teacher has dismissed with a *therefore*.

CHAPTER VII

BEGINNINGS IN EXPOSITION

ACCEPTING the view that Exposition consists essentially in producing among the elements of the mental content of the pupil a combination that coincides with the combination existing in the mind of the teacher, it is obvious that there must be a double process of analysis before a beginning can be made. First the teacher must review his own mental content so as to discover which elements are of importance for the present purpose. Naturally all the necessary ideas cannot be called up at once; but all the salient elements will readily come into consciousness, and the presentative activity of all the other relevant ideas will be quickened by the presence in consciousness of those that have actually risen above the threshold. The subconsciousness is filled with ideas bearing upon the subject. The mental content of the teacher is therefore in a favourable condition for entering upon the work of Exposition.

Next we have an analysis, as far as this is possible, of the pupil's mental content in relation to the matter about to be presented to him. This process obviously corresponds to the beginning of the Preparation Step, dealt with in last chapter.

Before we can prepare the mind of the pupil we must discover what parts of its content are relevant to the subject in hand. The regular teacher of a class has obviously a great advantage in this particular. From his previous dealings with the pupils he has a very effective knowledge of the ideas which he can rely upon finding at their disposal. With a new subject, or an entirely new branch of an old subject, there is a certain danger of fogginess about the available mental content. But even under such circumstances the class teacher need seldom wander far afield in order to find connecting ideas. A teacher with an entirely new class has of course to feel his way by questions and careful observation of the effects of whatever presentations he ventures to make.

With a fairly distinct knowledge of the ideas to be conveyed to the minds of the pupils and the complexes to be formed in those minds, and a less clear but still adequate knowledge of the ideas and complexes at present existing in the minds of the pupils, the teacher is prepared to enter upon the next stage, which consists in comparing the pupil mental content with the teacher mental content, and selecting a starting-point for the exposition. It will be found that the two mental contents overlap each other to some extent. There may be a larger or a smaller common segment, but in every case where Exposition is possible there must be some elements common to the two contents. If no common element can be found, Exposition is out of the question. Very frequently with a new or difficult subject the teacher has to cast about for a little before he finds the overlap that is necessary to secure a starting-point. Sometimes, on the other hand, the two mental contents coincide. In

other words, the pupils have all the elements necessary for the full understanding of the matter in hand, though these elements may be at present so arranged as to give a different result from that desired by the teacher. The complexes in the pupil-mind may be all wrong as tested by an objective standard, as, for example, in the first two stages of Herbert Spencer's progress towards a true theory of the colour of shadows.[1] In such cases the teacher's business is to break up the false complex by confrontation, and replace it by a better. But it sometimes happens that the pupil's complex is true so far as it goes, or true in certain connections, and yet there are other complexes to be made that are equally true, or that are true in a wider sense. In cases of this kind it is not necessary to break up the first complex. It may be temporarily analysed in order to separate out the elements so that they may be built up into the new complex that for some reason or other the teacher regards as necessary for the pupil. But there is no need to introduce dispeace into the original combination of ideas; it may quite well co-exist along with the new one, as a permanent part of the pupil-content, though the elements of which it is composed may now be capable of forming a totally different whole when required.

For example, the complex "primary colours" is made up of the elements red, blue, and yellow. But while this is found to be a true collocation so far as pigments and their manipulation are concerned, it is unsatisfactory when colours are treated from the standpoint of psychology. What are primary colours from the one point of view are not

[1] See p. 75.

primary from the other. But the pupil who has had the psychological primary colours—red, violet, and green [1] firmly grouped together as the result of later exposition, need not dispense with his old pigment combination of red, blue, and yellow. Both complexes are useful, each in its place. As a matter of fact, for the ordinary needs of life we have to adopt still a third complex, for we have even psychological authority for the statement that "the primary colours for the mind are the four principal colours—red, yellow, green, and blue." [2] When we begin to study chemistry and form new combinations of ideas, these need not in any way interfere with our old combinations as represented by such familiar phrases as "acid drops," or "table salt." The chemist may call these "trivial or irregular names," [3] but they represent wholes that are as real as those represented by his systematic terms. The rainbow complexes found in Genesis and in lyrical poetry need not be broken up because we have formed new combinations under the heading "the refraction of light."

It is seldom that the teacher needs to use up every individual element in a given complex in order to build up another complex. The much more common case is that there has to be a general analysis of the pupil-content in order to get the elements necessary to build up a desired complex. In the process, it frequently occurs that certain elements necessary for our new complex are found to be lacking, and must be supplied by the teacher before any progress can be looked for. In any case,

[1] Cf. *A Primer of Art*, by the Hon. John Collier, p. 44 ; and H. Taine : *On Intelligence*, bk. iii. chap. ii. § 1.

[2] Lightner Witmer, *Analytical Psychology*, p. 181.

[3] Dr. Edward Frankland, *Lecture Notes for Chemical Students*, p. 11.

the *beginning* must be made in that part that is common to the pupil-content and the teacher-content. Frequently there are many possible starting points within the common area, and the selection must be determined by the purpose the teacher has in view, and the line he intends to follow.

While it is admitted that the teacher must, at the beginning of his exposition, know definitely what his purpose is, it does not necessarily follow that this purpose need be communicated to the pupil. As a matter of fact, at present serious consideration is given to this problem among the German teachers. There is much that is of interest in the discussions that centre in what they call the *Zielangabe*—that is, the giving or statement of the purpose of the lesson at the very start. The term is usually closely associated with the name of Tuiskon Ziller,[1] though his critics spend a good deal of time in proving that the idea of stating clearly at the beginning of a lesson the purpose of that lesson is none of his invention,[2] and is in fact of very venerable antiquity. The text of a sermon, the title of a book, the heading of a chapter are referred to as familiar examples of the *Zielangabe* in ordinary life. But such cases do not always supply a parallel. Frequently the text and the title are used to whet curiosity rather than to indicate purpose. Indeed the misleadingness of titles is a cause of increasing complaint among readers. When the student of elocution punctiliously begins his recitation with "Maud: a

[1] See his *Allgemeine Pädagogik*, dritte Auflage, p. 162 ff.

[2] While there is little difficulty in finding examples of the application of the principle of the *Zielangabe*, it is not so easy to give cases in which it is deliberately applied as an educational principle. As far back as 1780, however, we find E. Ch. Trapp using in his *Versuch einer Pädagogik* (p. 315) the term *Zielsetzung*, which he uses in quite the Zillerian sense.

poem, by Lord Tennyson," his introduction can hardly be classed as an example of the *Zielangabe*. But when in our peculiar idiom a lecturer tells us that he "proposes" to do certain things in the hour at his disposal, we have a genuine *Zielangabe*.

The very fact that writers on Education have thought it worth while to use the word as a technical term, and to discuss its exact meaning and function, marks it out as indicating a noteworthy stage in the development of the theory of presentation. It indicates among other things the more or less conscious adoption of the heuristic attitude in opposition to the Socratic, as most suitable for the teacher to take up. By the very fact of recognising the necessity for the pupil to know the object of the lesson, the teacher proclaims that he expects his co-operation; in other words, the activity of the pupil is assumed. He is not merely to be supplied with facts and conclusions; he is to be made to work out conclusions for himself. The goal of the lesson is set before him as something to be attained; the means of attaining it are not specifically indicated. A great part of the value of the lesson would be lost if this were not so. Misapplications of the heuristic method supply illustrations of the abuse of the *Zielangabe*. "To discover the chemical composition of water" is a legitimate *Ziel* or aim to set before a class; but when we find in a pupil's note-book that the matter is put: "To find the chemical composition of H_2O," we realise that something has gone wrong. On the other hand, "To prove that water is composed of oxygen and hydrogen," is quite a legitimate *Ziel*.

It is clear that the *Zielangabe* cannot be limited to the lesson-unit. It would be inconsistent to maintain that the pupil must know definitely the

purpose of each lesson, and yet be kept in ignorance of the purpose of each part of the lesson. One *Ziel* is not enough to guide throughout a whole lesson. There must be many inter-aims, or as Campe calls them, *Zwischenziele.*[1] But if there are to be inter-aims, there must be inter-units. We must have our matter cut up into sections, at the beginning of each of which must appear an inter-aim or *Zwischenziel.* Each of these sections must be complete in itself, the completeness being determined in relation to purpose. They need not by any means be of the same length; the one condition is that they must be little wholes.[2]

Sometimes the *Zielangabe* becomes a mere matter of pedagogic routine, and exercises no real influence on the lesson. This is specially true of lessons that form part of a course. Here the whole matter dealt with by the teacher is so closely connected together that it is sometimes neither possible nor desirable to cut it up even into lesson-lengths, not to speak of smaller sections. The general amount of work to be done at each class meeting must of course be determined, but it does not follow that the whole need be separated into purpose units of uniform magnitude. The purpose of one lesson has frequently to be carried over into the next. Accordingly we find that sometimes the German teacher who is loyal to the theory of the *Zielangabe* finds himself forced to begin with the ludicrously

[1] "Soll die Jugend auf demselben nicht ermüden, so muss man ihn durch viele Zwischenziele verkürzen und angenehm machen. Auch ohne Rücksicht auf Erleichterung für die Jugend hat dieses Zielsetzen einen grossen Nutzen." (Campe, *Allgemeine Revision des gesammten Schul- und Erziehungswesens*, 8. Teil, 1787, S. 180 ff.). Quoted by Karl Richter.

[2] Amongst certain "long-known rules of teaching" Diesterweg includes "Lass das Kind kleine Ganze auffassen; gib ihm kleine Ganze."

attenuated *Ziel*: "Our object in to-day's lesson is to see what happens next."[1] . What leads to this absurdity is the notion that the *Zielangabe* is a sort of pedagogic rite to be gone through at the beginning of each lesson-period. The theory of the *Zielangabe* does not demand that the time-unit and the purpose-unit must be identical. The essential point is that the pupil should know whither he is going, so that he may co-operate with the teacher, and do his fair share of the work.[2]

It is true that there may be occasions when it is not only unnecessary but unprofitable for the pupil to be told the exact purpose of a lesson. In many lessons given on the Socratic method, for example, the very essence of the teaching is the unexpectedness with which certain conclusions are reached. It is well that the pupil should not know that the purpose of the lesson is to make him aware of certain gaps in his knowledge. In the Socratic method the pupil is working towards two ends: one

[1] "Ja nach einer Bemerkung in den 'Erläuterungen zum Jahrbuche von 1883,' die also nach Zillers Tode erschienen sind, hat Ziller später selber stillschweigend zugelassen, dass das Thema z. B. für eiue Geschichtsstunde auch so formuliert werden könne: 'Wir wollen sehen, wie es weiter geht.'" Karl Richter, *Die Herbart-Zillerschen Formalen Stufen*, p. 131.

[2] "Nicht nur der Lehrer muss wissen, was er in dieser Stunde erreichen will, sondern auch die Schüler sollen es wissen, dass ein bestimmtes Ziel gesteckt ist, über das sie am Schlusse der Stunde müssen Rechenschaft geben können. Dadurch wird der Gedankengang konzentriert, es wird das Gefühl der Erwartung und Spannung, die Lust und Freude zur Lösung der gestellten Aufgabe erregt. Fehlt jenes Ziel, so wird der Schüler wie ein Blinder mit verbundenen Augen vom Lehrer geführt, und eine eigene Willensanstrengung ist unmöglich. Die Schüler müssen am Schlusse der Stunde eine bestimmte Antwort auf die Frage geben können: Was habt ihr heute gelernt? Wovon habe ich gesprochen? Schlimm ist es, wenn sie keine Antwort geben können, oder vielleicht sagen: 'Wir haben allerlei gehabt.'" Ferdinand Leutz, *Lehrbuch der Erziehung und des Unterrichts*, 4. Auflage, zweiter Teil, p. 40.

that he knows he is working towards, and one that is known only to the teacher. It does not follow that pupil and teacher are working at cross purposes. We are dealing here with the *educational* effects, and these are best produced without the pupil's conscious co-operation. His co-operation is of course essential, but the teacher loses his position of advantage as an external influence if he explains to the pupil the educational effect to be produced, and urges him to assist in being educated.

Even in matters of mere knowledge it may sometimes be an advantage to omit a statement of the *Ziel*. It is largely a matter of the distribution of interest. When the *Ziel* is given, the interest lies in the means of attaining it; when it is withheld, the interest lies in the process itself, particularly in relation to the suspense as to what it is going to lead up to. This contrast between the place of the *Zielangabe* in the heuristic and the Socratic method will if carefully investigated lead to the conclusion that the real difference lies in the magnitude of the purpose-unit. No teacher would suggest that his pupils should be kept entirely in the dark with regard to the purpose of the work he is engaged in. The question always is how wide an outlook it is advisable to offer them. With advanced pupils[1] we can give much wider aims than those that apply to each lesson as it comes round. It is probable that teachers are too easily content with the mere *Zwischenziele*: it is certain that the pupils are. So long as the pupil is allowed to go on dealing with each step as an independent unit, he is usually quite content to work away without looking for any

[1] Campe tells us: "So wie die Jugend heranwächst, kann man die Hauptziele nach Monaten, Viertel- und halben Jahren steeken." *Allgemeine Revision*, as above.

wider or deeper meaning. Pisgah views are not to his liking, and he will certainly not climb the mountain unless under pressure, or at least under encouragement. One of the redeeming features of school examinations is that they bring into occasional prominence the main aims (*Hauptziele*) that give meaning to the *Zwischenziele* with which the pupil is too apt to be content.

Teachers of Arithmetic are now laying great stress on the need for clearly imaged ends in the minds of the pupils before beginning to work out problems. The pupil must not be left merely to multiply and divide in the hope that somehow the answer will come out. The following extract gives a graphic account of a state of mind that is too common in our schools. It is taken from a school story called *The Rickerton Medal*, which is the work of a practical teacher. The scene is a class-room in an elementary school. Mr. Leckie, the teacher of the class (Standard VI.—average age about 13) propounds a problem in Arithmetic:

"If 7 and 2 make 10, what will 12 and 6 make?"

A look of dismay passed over the seventy-odd faces as this apparently meaningless question was read. Everybody knew that 7 and 2 didn't make 10, so that was nonsense. But even if it had been sense, what was the use of it? For everybody knew that 12 and 6 make 18—nobody needed the help of 7 and 2 to find that out. Nobody knew exactly how to treat this strange problem.

Fat John Thomson from the foot of the class raised his hand, and when asked what he wanted, said:

"Please, sir, what rule is it?"

Mr. Leckie smiled as he answered:

"You must find out for yourself, John: what rule do you think it is, now?"

But John had nothing to say to such foolishness. "What's the use of giving a fellow a count[1] and not telling him the rule?"—that's what John thought. But as it was a heinous

[1] *Scotice*: any kind of arithmetical exercise in school-work.

sin in Standard VI. to "have nothing on your slate," John proceeded to put down various figures and dots, and then went on to divide and multiply them time about.

He first multiplied 7 by 2 and got 14. Then, dividing by 10 he got $1\frac{2}{5}$. But he didn't like the look of this. He hated fractions. Besides, he knew from bitter experience that whenever he had fractions in his answer he was wrong.

So he multiplied 14 by 10 this time, and got 140, which certainly looked much better, and caused less trouble.

He thought that 12 ought to come out of 140, they both looked nice, easy, good-natured numbers. But when he found that the answer was 11 and 8 over, he knew that he had not yet hit upon the right tack; for remainders are just as fatal in answers as fractions. At least, that was John's experience.

Accordingly, he rubbed out this false move into division, and fell back upon multiplication. When he had multiplied 140 by 12, he found the answer 1680, which seemed to him a fine, big, sensible sort of answer.

Then he began to wonder whether division was going to work this time. As he proceeded to divide by 6, his eyes gleamed with triumph.

"Six into 48, 8 an' nothin' over—2-8-0 an' no remainder. I've got it!"

Here poor John fell back in his seat, folded his arms, and waited patiently till his less fortunate fellows had finished.

. . . . . .

James[1] knew from the "if" at the beginning of the question that it must be proportion; and since there were five terms, it must be compound proportion. That was all plain enough, so he started, following his rule.

"If 7 gives 10, what will 2 give?—less."

Then he put down

$$7 : 2 : : 10 :$$

Then if 12 gives 10, what will 6 give? again less." So he put down this time

$$12 : 6$$

Then he went on loyally to follow his rule; multiplied all the second and third terms together, and duly divided by the product of the two first terms. This gave the very unpromising answer $1\frac{3}{7}$.

He did not at all see how 12 and 6 could make $1\frac{3}{7}$. But that wasn't his look-out. Let the rule see to that.

The problem of beginning is often complicated by the fact that it is not recognised as a problem.

[1] The clever boy of the class.

It seems so easy. There are so many possible beginnings that it would appear that one could hardly fail to hit upon something that will exactly meet the case. Some teachers in fact deliberately minimise the importance of the beginning. Too much time is spent over considerations of beginning, they maintain, and advise their pupils to get to work anyhow. The important thing, they say, is to get a start. It does not matter how you begin, so long as you get begun. There is perhaps a certain justification for all this impatience. An experienced editor in engaging a brilliant young man to assist him in preparing for the press manuscripts that had been accepted for his magazine, gave this advice: "In many cases, particularly with essays, you will find it a good plan to cut out the first paragraph. The author gets down to business in the second. You will of course be prepared to have all the authors complain that the first paragraph is the best in the essay, the fact being that they have given so much time and care to the beginning that they have lost all sense of its true value." What the editor objected to here is not so much beginnings as "introductions." No one is more tired of formal openings than the experienced trainer of teachers. He of all men is fully convinced that Introductions are excellent things to omit. But the lesson must be begun all the same, and the problem of the beginning remains.

It may not be a logically justifiable statement that there are many degrees of beginning, but it contains a definite meaning. We have indeed the whole range from the beginning of an entirely new subject to the beginning of a new sentence. There is a certain rhythm in teaching, and each new beat in this rhythm implies a new beginning. Obviously

the longer the beat the more important the beginning. It is, however, only at the bigger divisions of a subject that any serious problem arises. At the subordinate divisions the beginning is practically determined by what has gone before. In dealing with a subject, the teacher acquires a swing that carries him on over all the smaller breaks in continuity. A lesson in the middle of a course has to a certain extent determined its own beginning with regard at least to matter, and often with regard to form as well, inasmuch as the reaction between teacher and pupil throughout the course has led to the development of the teacher- and pupil-content in such a way as to establish a more or less inevitable interaction between them. But the very beginning of a new subject, and especially when the teacher is new to his class, presents a very different problem. It involves the breaking in somewhere or other into the pupil's circle of thought, and it is often of material consequence where this irruption takes place. The subject-matter may be approached from many different points, and nothing but a fair knowledge of the pupil's mental content can determine which it is best to select.

That this difficulty in beginning is not an imaginary one originating in an excess of refinement in method is proved by the trouble often experienced in ordinary life when we set about explaining anything that is in the least complicated. We often toss about for a while seeking the most suitable starting-point. Sometimes, indeed, we actually put our difficulty into words, and ask: "Well, now, where shall I begin?" And it is to be noticed that we do this even in what we are apt to regard as the simplest case, that is, in the telling of a story. When a Frenchman does not follow a confused

story, as it is being told to him, he is apt to say to the story-teller: "Si tu voulois commencer par le commencement." The reference is to Anthony Hamilton,[1] the brilliant Irish writer of French fairy-tales. In one of Hamilton's stories Moulineau the giant calls upon the ram (who, of course, is one of the speaking kind) to cheer him up by telling some pleasant tale:

> The ram, after having meditated for a little, began in this way:—
>
> "After the wounds of the white fox, the Queen had not failed to pay him a visit."
>
> "Ram, my friend," said the giant, interrupting him. "I understand nothing of all that. If you would begin at the beginning, you would give me pleasure; for all those tales that begin in the middle only confuse the imagination."
>
> "Very well," said the ram, "I consent, against the custom, to put everything in its place; accordingly the beginning of my story [*histoire*] will stand at the head of my narrative [*récit*]."

Here Moulineau takes it for granted that it is a self-evident proposition that we should always begin at what he calls the beginning. No doubt there are intellects for which this rectilineal arrangement is the best possible. Moulineau would have been at home in China where, we are told, the drama begins with the birth of the hero, and goes straight on. Even in England there is room for the Orthographic story of the *Robinson Crusoe* type:

> I was born in the year 1632, in the city of York, of a good family, though not of that country, my father being a foreigner of Bremen, who settled first at Hull . . . &c.;

but there is also a place for the *Iliad*, *Paradise Lost*, and the modern complicated novel that begins in the middle of the plot. Yet Moulineau is right in insisting upon beginning at the beginning; his

[1] Died 1720.

mistake lies in supposing that chronology is the only element that determines what a beginning is. Time is of course of fundamental importance in thinking, but it must not be allowed to dominate the expositor in his selection of material. He must be guided in every case by the purpose he has in view. In dealing with Moulineau it is clear that the proper order is chronological; in dealing with a jaded public tired of the ordinary and in search of excitement, the ram's successors are entitled to neglect the chronological order, and to adopt the chronological middle or end for their purposive beginning. The expositor wishes to produce a certain arrangement of ideas in the mind of another; the beginning that lends itself best to the production of this arrangement is the best.

The teacher begins, for instance, with a blackboard full of figures from the Board of Trade returns for the past ten years, from which the pupils are invited to discover which are Britain's best customers in the matter of buying her goods. Various ups and downs are noticed, and causes suggested. One sudden fall is unaccounted for. Towards the end of 1906 Italy began to buy a good deal less from us. The fall is not temporary, for there has been no corresponding rise since. Italy is not hostile to us; rather the contrary. The cause must be sought elsewhere. More figures are submitted, from which it appears that what we have lost Germany has gained. But why this sudden change? Germany is no nearer Italy than it was before; there has been no quarrel with our goods; the Germans may be better at pushing goods, but there was no sudden increase in their superiority at that time. Gradually the search is narrowed down to something peculiar that belonged to that year, and the opening of the

Simplon Tunnel in May 1906 is suggested. Since this beginning occurs in a lesson in Commercial Geography, the tunnel is approached from the proper point. Moulineau would have insisted upon beginning with the tunnel.

A problem of this kind is often an excellent way of beginning an exposition. Instead of starting straightway with the subject of the difference between the development of the Feudal System in England and in France, the problem might be suggested: Why are there hedgerows in England and not in France? In answering this interesting question all the essential points of difference emerge, and the incentive of a well-defined purpose is maintained throughout the lesson.

The problem of beginning is important, not merely because of its relation to the interest aroused, but also because it practically fixes the order in which the lesson must afterwards proceed. In a lesson on the development of the butterfly we may begin with the egg, or with the imago, with the grub or with the chrysalis. If we begin with the egg, we would satisfy Moulineau, and follow the development upwards. If we begin with the imago, we follow the development backwards. In both cases we have no break in the time series. If now the start is made with either of the intermediate states, there must be a double progress, one part forwards the other backwards. At first sight it would appear that there is only one way of beginning this exposition properly. The egg seems the only natural beginning. But most pupils have seen a butterfly, while comparatively few have seen a butterfly's eggs. In most cases, though the egg would form a part of the teacher's mental content, it would not form part of the pupil's, and therefore would not prove a

suitable commencing element. On the other hand, if the teacher possesses specimens of the eggs of butterflies, he might quite well start with the idea of egg in general, which of course forms a common element in teacher- and pupil-content, and then present the specimen eggs as new matter to be correlated with the old. Out of the common elements it is always the teacher's business to select those which will lead to the desired result with the minimum expenditure of time and energy. In certain subjects the difficulty of choosing the proper elements is much greater than in others. In Mathematics, for example, there is much less liberty of choice than in, say, History and Geography. The connection among the different points in the subject is so close that it is impossible to present them in any but one order. Yet even in Mathematics there is great diversity of opinion as to the order in which certain elements should be presented. At what stage, for example, should the idea of an equation be introduced in the teaching of Algebra? Should decimal or vulgar fractions come first in the teaching of Arithmetic? Again, the whole of the propaganda for what is called the New Geometry is an exemplification of the importance placed on the beginnings as determining the after processes.

As there are many beginnings throughout the course of a lesson, so there are many endings. Every beginning implies an ending of the same degree of importance as itself. Naturally the ending of a lesson or a section has to be as carefully considered as the beginning. In point of fact they must be considered together. Indeed, it may be said that the end determines the beginning. The principle of the *Zielangabe* demands that the pupil shall know the end, at least in the sense of the aim

or purpose. But the teacher must know the end also in the sense of the termination. He must know what his process is going to accomplish, and he must also know how his process is to terminate. He must know the end from the beginning, and further, he must correlate the beginning to the end. It is true that much may happen of a very unexpected character between the beginning and the end. It is in this intermediate period between the beginning and the end that the teacher's individuality has most scope; but in order that he may make the best use of his opportunities it is essential that at the preparation stage he should determine his beginning and ending. There is nothing to hinder him making the beginning that he fixes upon as best. The plan that he resolves upon in his study he can at once proceed to carry out in the class-room. With the ending it is different. Too frequently the actual ending has little resemblance to the ending that had been projected.

Sometimes in the course of a lesson the teacher discovers that he has made a mistake in his private review before the lesson. Occasionally it is a mistake in the subject-matter that he did not notice in his preparation, and is only brought out in the process of teaching. More usually the trouble arises from the discovery that his pupils know less or more of the subject than he had given them credit for. In such cases it is essential that the predetermined end should be modified. But in all other cases it is highly desirable that the selected end should be reached. The teacher must be very elastic in his arrangements for meeting unexpected developments in the course of the lesson, but he should be tenacious in his efforts to reach

the predetermined stopping-place. Unforeseen difficulties may arise to disturb the prearranged distribution of time, and the teacher may thus not get within reasonable distance of the point at which he had resolved to close. This contingency should be provided for by selecting beforehand a series of possible endings throughout the course of the lesson—the attainment of each *Zwischenziel* should be a possible ending—and by cultivating a very tender conscience with regard to using them. The teacher should feel that every time he has to adopt one of those alternative endings he has made a blunder in his calculations. On the other hand, to persist doggedly in getting to a prearranged end, whether the pupils are able to follow or not, is worse than a blunder.

In any case, the point at which the lesson actually stops should be recognised by both teacher and pupil as a natural end. It must not be a mere cessation of a process, as in the case of a street organ that stops operations in the middle of an air. Nor must the teacher merely allow himself to run down like a clock that gradually ticks more and more feebly till at last it stops. Nor must the end be reached by mechanical stages that the onlooker can anticipate. The mannerisms by which some teachers let it be understood that the end is approaching frequently indicate rather the termination of the hour than the end of the lesson. The true ending is felt to be an ending as soon as it is reached. At the end of a discourse it used to be the custom in France for the speaker to add the words: *J'ai dit.* At the end of an address arranged in the admirable form for which French speakers are noted, the words came as the inevitable conclusion. They were felt to be the only words that

would not have been irrelevant at the point at which they were introduced.

In every case the ending should find a natural place in the rhythm of interest. The predominant feeling at the ending points should be one of satisfied interest; but this satisfaction should be unstable. The interest in the particular section should be exhausted, but the interest in the wider whole of which the section is a part should be maintained. The interest to be carried forward should belong to the section that is to come, not to that with which the lesson finished.

CHAPTER VIII

ORDER OF PRESENTATION

It is one thing to acquire knowledge for oneself; it is quite another to communicate that knowledge. When we say we have mastered a subject, we mean that we have not only amassed all the available matter, but have rearranged that matter so as to have it in an organised form, in which each element occupies its true relation to all the others. Teachers are apt to rest satisfied when they have reduced their mental content to this logical order, and to think that they have nothing further to do than to present the matter in the order to which they have reduced it. Many teachers will admit having had something like the following experience. When preparing for the first time a scheme for a systematic course in a certain subject, the thought forces itself into the mind: "Why wasn't I taught this subject in this logical way? When I was a pupil the matter always appeared to me as a thing of shreds and patches; I shall take care that my pupils are taught differently." The cause of the trouble is that we are confusing knowledge in its ripe and in its green state. The logical point of view necessarily implies a complete knowledge of the field to be covered. It represents the view

that we may take of an experience that we have had, which is never quite the same thing as the anticipation of the experience we are going to have. The learner is feeling his way into a region that is already well known to the teacher, who must, therefore, modify his presentation to meet the needs of the pupil rather than to satisfy the demands of logical sequence.

It is natural that we should suppose that Logic ought to determine for us the order in which matter should be presented; but experience has shown teachers that they must not depend too much on logical arrangement in presenting matter to young people. Even when dealing with grown-up educated people it is necessary to be on our guard against a too rigid adherence to logical presentation. In describing to teachers how the structure of animals should be taught, Sir Archibald Geikie interrupts himself to remark:

> For the sake of logical sequence, I have placed the consideration of form before that of function. But in actual practice it will not be always possible, even were it desirable, to separate these two subjects sharply from each other.[1]

It may be logical to complete an account of the structure of an animal before saying a word about the functions of the various parts, but it is certainly not the best mode of exposition. The head of a London Training College in dealing with Grammar tells us:

> Obviously the psychological order (and that is the order to be followed in school-teaching) is (1) the acquirement of the use of language; (2) the analytical investigation of language—that is, Grammar. But, it might be argued, Grammar deals with the presuppositions of language, and therefore the logical order is (1) Grammar; (2) the acquirement of language. Teachers

[1] *The Teaching of Geography*, p. 109.

have, however, discovered as the result of much unproductive labour that it is impossible to adopt the logical order in teaching children. When, indeed, the pupil has reached a certain stage in the acquirement of the use of language, then Grammar may be a means of helping him to increase his mastery ; but it is impossible to begin that way.[1]

Still, it must not be supposed that even in dealing with young people, there is something objectionable in logical sequence in itself. On the contrary, the logical sequence represents the ideal order which must be followed as far as that is possible. Every deviation is a concession to human weakness. For the teacher the logical sequence of the facts to be dealt with is the beginning of the process of exposition ; for the pupil it is the end.

In his essay on the *Philosophy of Style*, Herbert Spencer seeks for a general principle underlying all the recognised rules for verbal expression, and finds it in "the importance of economising the reader's or hearer's attention."[2] Every time we use the wrong word or the wrong order of words, we cause certain wrong combinations to be formed in the mind of the pupil, and the necessary correction of these errors is sheer waste of time and energy. Spencer does not go into the *mot propre* theory that for a given place in a given sentence there is one word, and one word only, that will perfectly meet the case ; but he comes near to maintaining an equally rigid principle for the order of words in a sentence : "We have *a priori* reasons for believing that in every sentence there is some one order of words more effective than any other."[3]

Even when a sentence is grammatically correct and is ultimately intelligible, it may have its parts

[1] L. Brackenbury, *The Teaching of Grammar*, p. 7.
[2] *Essays*, stereotyped edition, vol. ii. p. 11.
[3] *Ibid.* p. 16.

so badly arranged that an altogether disproportionate amount of time and effort must be expended over it. Both of the following sentences, from authoresses of some distinction, exemplify bad order of presentation:

I am sure, too, the reputed Hibernian has afforded much innocent amusement who, on making his first journey asks why, if it be true that the last carriage is, as he has been told, dangerous to travel in, it is not taken off.

The crowd of faces congregated round her, and from its midst emerged the one she shunned supremely; his whose, while her will remained, she must with the last remnant of it, shut away.

It is probable that Spencer carries his theory into too great detail. For example, he prefers the English order "black horse" to the French "cheval noir." In all probability, in both cases the two words are simultaneously received by the mind, and the figure of the animal occurs as accurately to the Frenchman as to the Englishman. For it has to be noted that Spencer in his essay takes it for granted that all thinking is figurative. His view is, that if we mention the horse first, we at once make a picture of it, and since we are not guided as to its colour, we are more likely to make it brown than black, because there are more brown horses than black ones. When the word *black* occurs, we have to recolour our mental horse, and in this way lose time and waste energy.

Spencer should have gone further with his contrast between the black horse and the *cheval noir*, for the French have certain very definite customs in the matter of the order of their adjectives. The underlying principle appears to be that, if the quality is inherent in the substantive, the adjective should precede; while if it is an

accidental quality, as colour or nationality, it should follow. "Votre aimable fille" is a compliment not only to your daughter, but to you and her sisters. "Votre fille aimable" is still a compliment to this particular daughter, but at the expense of her sisters and of yourself—it is no longer taken for granted that amiability is innate in your family. The French have thus a means, denied to us, of conveying a distinction, and it is not likely to be maintained that French thinking is retarded in consequence.

Whatever may be true about the possibility of simultaneously grasping the meaning of a substantive and its adjectives, there can be no doubt that, when we come to larger divisions of thought process, great differences occur according to the order in which elements are presented. The total effect of a presentation is not necessarily the same in two exactly similar cases because precisely the same elements have been used in each. The order in which the elements have been presented counts for something, frequently for a great deal. An excellent example is to be found in the loss of cumulative effect when a series of elements is presented without regard to their degree of stimulating power. A passage may exemplify the rhetorical figure of climax, or may convey merely an unpleasant effect of mental jolting, according as the elements are arranged in regular order of stimulus, or "just as they come."

It may be suggested that the effect here is rather æsthetic than intellectual, and it may be asked: Is it not possible that the same intellectual effect may be secured by quite different orders of presentation? As a matter of fact, it may be urged, we have practically all of us gained our present knowledge and opinions by different lines of study and experience.

No two of us have had our mental content presented to us in quite the same order. This has to be admitted. But, on the other hand, it will hardly be denied that, however our knowledge has been acquired, no two among us have quite the same mental content, and even if it were possible that two of us should turn out to have the same mental content so far as matter goes, the arrangement of that matter is almost certainly different. Mathematicians are usually quite willing to spare a little time to show the excessively remote chances of mental coincidences of this kind. We are what we are, not merely because we know what we know, but because we possess our knowledge in a particular way.

It is true that, even if we have been badly taught, we may have corrected the errors into which we have fallen, and have now reached the same stage as others who have been better taught and have therefore reached their present stage with less difficulty. But it is at least arguable that in the process of being badly taught the pupil has received permanent injury, as well as suffered loss of time and energy. It may be that our present state of knowledge in any subject may bear definite traces of the process by which that knowledge has been acquired. In one of his Essays, Grant Allen tells us that at every moment we are shutting out one half of the possibilities of life, that every choice we make is a dichotomy. The accompanying diagram may represent Grant Allen's view. Starting from A, we may reach K by a series of four dichotomies. We may obviously pass from A to K in various ways. We may take the upper passage A B G H K, or the lower, A C F E K; or we may take a zigzag course, A B D H K or A B D E K. The important point for

us to consider is whether the result when K is reached is the same in all cases, no matter what the route has been. The conclusion seems inevitable that the route does modify the result. Take the German possessives *ihr* = her, and *sein* = his. To a pupil who approaches this matter from the standpoint of English, there need never be any confusion between *ihr* and *sein*; the gender of the substantive possessed only affects the words to the extent of modifying the termination. To an English pupil, however, who approaches the subject through

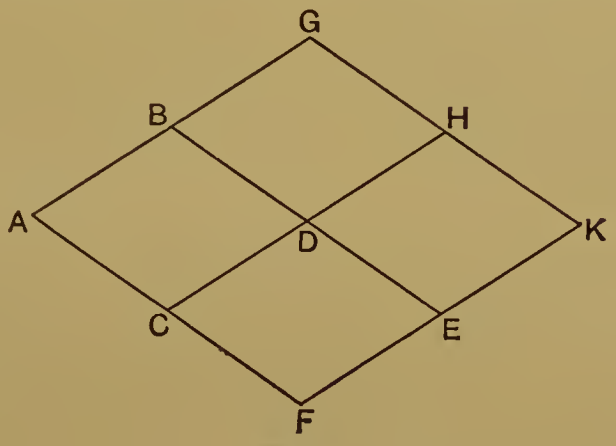


FIG. 4.

French, there is frequently a long period of struggle with the confusion that results from the fact that, in French, *sa* may mean *his*, and *son* may mean *her*. Experience shows that in book-learned German this confusion persists long after a clear statement of the facts has been thoroughly understood by the pupil. He has an intellectual perception of the facts of the case quite as clear as that of his fellow who has made the English approach, but he does not know them in quite the same way.

The very adjective used above, "book-learned," in itself either begs the question or proves that a

fact learned from a book is not quite the same thing as the same fact learned in some other way. The balance certainly appears to incline towards the difference of the result according to the means of obtaining it. Pupils who have suffered from bad exposition nearly always retain a certain lack of confidence in the use of matter that has been thus presented to them.[1] They are apt to bring in as part of the completed whole certain combinations that occurred where they had no right to occur in the original process of presentation. They were explained away, no doubt, at a later stage, but they have left their traces.

Even in simple narrative the order of presentation is important to a proper understanding of the point to be brought out. Here the mere time order in which the events occurred is usually sufficient to determine the order of presentation. When the careless story-teller breaks in upon his narrative with the apologetic: "Oh, by the by, I forgot to tell you . . ." it means that he has bungled his presentation. It does not as a rule mean that he has forgotten some unimportant detail, but that he has suddenly found that he has omitted an important section, without which the whole is meaningless. He has accordingly to break the current of interest, and generally succeeds in confusing the impression on the listener's mind. This does not mean that the listener does not catch the point of the story, but that the point has been blunted. In order to illustrate the fact that illiterate people may form a just estimate of the "values" of a picture, a very

[1] The *ihr* and *sein* difficulty may entirely disappear under the influence of the constant use of German, but let a discussion arise about a particular case, and the old doubt will sap the confidence of the victim of confused presentation.

effective lecturer told the story of the English lady who was accompanied by her maid while visiting a certain church in which there was a very fine picture of the Flight into Egypt. Talking down to the intelligence of her maid, the lady asked if she did not greatly admire the oleanders in the picture. The reply contained an unintentional reproof: "I wasn't thinkin' o' the oleanders, but o' the 'oly family." Unfortunately, in using the illustration the lecturer began the maid's reply "I wasn't thinkin' o' the 'oly family, but——." Though he caught himself up at once and reversed the order, the point was ruined. No amount of emphatic explanation could produce the clear-cut effect the illustration had produced on previous occasions. The audience understood the point all right, but its effect was gone.

The general line of presentation is practically determined by the beginning, since this in its turn is determined by the purpose of the exposition, as was shown in the last chapter. We are assumed, therefore, to know (1) the purpose we have in view, (2) the part of the pupil's mental content that is relevant, and (3) the new material we propose to use. The question now arises: In what order is the presentation to be made? It may be objected that it is hopeless to discuss such a question apart from the nature of the particular matter, as this would seem to court error by omitting the most important element. But while the details of presentation must always be determined by the needs of each particular case, there is a certain body of general principles that are applicable to all cases, and give us some guidance in dealing with each new set of circumstances. It is true that these principles are of a somewhat general

nature, and indeed they are sometimes so vague as to amount to little more than pious aspirations. "Instruct so that the matter given shall be learned" does not seem to carry us very far; nor does it greatly improve matters to add—"and so that its culture content may exercise its due influence."[1]

But certain principles that bear directly on the order of presentation have recommended themselves to teachers generally, and have obtained very wide recognition, perhaps because of their very obviousness. The same interest in presentation that led Herbert Spencer to seek for the underlying principle of literary expression induced him to set forth in his little book on *Education*[2] these fundamental principles. It is not suggested that he originated them, and it is not our present business to trace each of them to its source. We are mainly interested in the possibility of their application in our work, and it is convenient to have them in the clear way in which they are presented by Spencer.

There are six of these principles in all, but only the first three and the fifth concern us here. They run: In Education we should proceed (1) from the simple to the complex; (2) from the definite to the indefinite; (3) from the concrete to the abstract; (4) "The education of the child must accord, both in mode and arrangement, with the education of mankind considered historically." This is clearly not germane to our present purpose; but from it is drawn a principle that is important to us. As a special case of this fourth principle comes the fifth: (5) We must proceed from the empirical to the rational. (6) "Self-development should

[1] Otto Willmann, *Didaktik als Bildungslehre*, Band II. p. 64.
[2] Chap. ii. *Intellectual Education.*

be encouraged to the uttermost," is now very generally accepted, but, like principle number four, it has no direct bearing upon our subject.

In the very severe criticism to which Spencer's book on *Education* has been subjected, it is interesting to find that these general principles have met with the least opposition. They have not indeed escaped altogether, but most of the objections raised are concerned with the meaning attached to certain terms, and the critics, after they have made their protest, practically restate what Spencer wanted to say,[1] though his mode of expression did not meet with the approval of the critics. For example, we are left a little in doubt whether he meant his principles to be principles of education, or merely principles of teaching. As a matter of fact, he lets us understand that he is dealing with the order of development of the mind, and since Exposition ought to follow that order, the two positions, the educational and the expository, ought in his opinion to coincide.

It will be generally admitted that we ought to proceed from the simple to the complex, though disputes naturally arise regarding what is simple

[1] The same is true about the general criticism of the prineiples themselves, apart altogether from their connection with Spencer. Their blatant obviousness seems to urge critics to find fault with them. This is what Tuiskon Ziller has to say in his *Allgemeine Pädagogik*, p. 262: ". . . und so falsch der Grundsatz war, dass im Unterrichte vom Einfaehen zum Zusammengesetzten fortzuschreiten sei, ebenso falseh ist der andere vulgäre Grundsatz, dass vom Bekannten zum Unbekannten fortgeschritten werden müsse." Then he proceeds, as one expects, to explain that he does not quite mean what he says. He does not seek to reverse the principle, but merely to bring out what it really means. We advance not from the known to the unknown, but to the presently unknown, "mit Hülfe des Alten und Bekannten." For a more helpful criticism see Professor Welton's *Principles of Teaching*, p. 62 ff.

and what complex. Spencer's meaning is made plain in his own words: "not only that we should proceed from the simple to the combined in the teaching of each branch of knowledge; but that we should do the like with knowledge as a whole."[1] Thus stated, the principle would preclude the exposition of a complex by means of analysis; we would seem to be limited to synthesis in our teaching. But it may readily happen that the pupil knows a complex quite well, and yet is ignorant of the elements of which it is composed. A man may know what prose is, and be able to use it effectively, without knowing the elements of which it is composed, and the laws of their combination. No doubt in acquiring the mastery of the use of prose the man followed the general principle, but in exposition it is surely legitimate to reverse the process. A pupil may know the rule for dividing vulgar fractions, and may be able to apply it with great effect. He follows his instructions to "invert the divisor and proceed as in multiplication," and gets the desired result. He knows the rule as a complex,[2] but he may not be aware of the elements out of which the rule is built. In such a case the expositor may well proceed from the complex to the simple. There is sometimes a little confusion between the simple in itself, and the simple to understand. Spencer is aware of this danger, and warns teachers that "a generalisation is simple only in comparison with the whole mass of particular truths it comprehends —that it is more complex than any one of these

[1] *Education*, chap. ii. p. 65 (Cheap Edition).

[2] Of course it may be quite reasonably objected, that a well-taught boy ought not to have this complex; but granted that the pupil has been badly taught, the expositor's best plan is to work from the results already attained, however bad they may be.

truths taken singly," [1] and thus he feels the necessity of laying down the "concrete to abstract" principle. With this rule the teacher need have no quarrel, since it will be found to be impossible to break it. It is true that attempts have been made to teach in the reverse order, and to pass from the abstract to the concrete. Indeed, for centuries teachers believed that they were teaching from the abstract to the concrete. They taught Latin by laying down rules and then setting their pupils to apply these rules. The pupils learnt Latin, no doubt, but not because of the rules they learnt. They did not understand Latin because of the rules, but the rules because of the Latin. The teachers did not really teach at all. What they did was to provide means by which Latin might be learned, and then to place their pupils in circumstances in which it was unpleasant not to know Latin. The master thought he was teaching from the abstract to the concrete, but the pupil actually learned from the concrete to the abstract. It is impossible to learn in any other way. The abstract is necessarily unintelligible unless it has been reached by means of the concrete from which it has been derived. With an entirely new abstraction in relation to an entirely new bit of the concrete the mind can work in only one way. The concrete must precede. But in ordinary experience cases of pure abstraction are rare. We nearly always know something about the materials from which abstraction has been made, and the mind passes from what it knows of the concrete to deal with the abstraction that is presented to it. From the abstract statement "things that are equal to the same thing are equal to one another," the pupil

[1] *Education*, chap. ii. p. 67.

may be made to pass to the concrete case, that if Tom is the same height as James, and William is the same height as James, then Tom is the same height as William. But the abstract statement, so far from making clear the equality in the height of Tom and William, would not be even intelligible to the pupil but for many similar measurements that have been made in his experience before the abstract statement was heard of. Indeed, is it not a contradiction in terms to maintain that one can understand an abstraction without first knowing the something from which the abstraction has been made?

The truth is, that in ordinary life there is a constant alternation between the abstract and the concrete, in the process of acquiring knowledge. By careful examination of the concrete we reach a certain abstraction; but we at once proceed to apply this abstraction by making a new connection with the concrete. As the result of abstraction from many concrete cases Mill enunciates his canons. Forthwith he exemplifies them by means first of letters, and then by still more material examples. He appears to be teaching from the abstract to the concrete, but in so far as his abstractions are understood at the first presentation, they are understood in terms of the concrete experience of the pupil. Logical presentation is possible with pupils who have a wide though ill-arranged knowledge of the subject. Grammar, for example, may be taught in logical order to a person who has a really good working acquaintance with the language in connection with which it is to be taught. The very limitation here involved is suggestive. The language assumed to be known forms the necessary concrete.

In many cases the facts to be presented are of co-ordinate rank and may be brought forward in almost any order. Take the different kinds of subordinate clauses as these are dealt with in the analysis of sentences. It does not matter much whether we begin with the Noun Clause, the Adjective Clause, or the Adverb Clause, on the understanding that the pupils have already mastered the Parts of Speech and are familiar with their functions. On the other hand, if grammatical construction is being approached by means of the Analysis of Sentences instead of by Parsing, then it might be desirable to begin with the Noun Clause rather than with either of the others. Indeed, when the teacher comes to the point of choosing the order of presentation, he will almost always find that there is some one order that for some reason or other ought to be preferred. Further, this order is not a permanent one. Next time he has to deal with the same matter, but with a different class, he may find that a different order is preferable. The various clauses of Magna Charta are to a certain extent co-ordinate. They form part of the one great document. But their order of presentation would be different under different circumstances. For example, if we are considering the document merely as a document—as a specimen in the science known as Diplomatic—the clauses would be dealt with in the order in which they occur on the parchment. In general constitutional history the clauses would be presented in their order of importance to the constitutional history of the country. We might either begin with the least important and work up to the most important, or we might reverse that order. On the other hand, if our main purpose is to illustrate some

special point—say the position of the artisan class in the Thirteenth Century—our presentation might centre round one point, for instance, the term *Contenement.*[1] If our interests are mainly in commercial matters, the clauses dealing with weights and measures, and personal freedom of movement from place to place, might come in the first rank.

It not infrequently happens that in expounding a particular subject there are two or three terms to be explained, and the whole subject cannot be properly understood until these subordinate terms are made clear. Sometimes lengthy expositions of these subordinate terms are given, while the whole process of understanding the main subject is suspended. Occasionally this is inevitable. But we must regard it as a danger-signal when we have to introduce some such statement as: "Before we can proceed to the consideration of the subject at issue, it is necessary," etcetera, etcetera. Every time we interpolate explanatory matter we must satisfy ourselves that there is no more suitable place for it; and when we see no way of avoiding the interpolation, we must do all we can to prevent its materially interfering with the flow of the main line of thought.

We must always try to keep our subordinate explanations closely connected with our main subject and with each other. In order to explain A, of which the pupils know a little, we may have

[1] A "freeman shall not be amerced for a small fault, but after the manner of his fault; and after a great crime, according to the heinousness of it, saving to him his contenement; and after the same manner a merchant, saving to him his merchandise." Then the explanation is in place: *Contenement* signifies the chattels necessary to each man's station, as the arms of a gentleman, the merchandise of a trader, the ploughs and waggons of a peasant.

to explain X and Y, of which they know less. We must guard ourselves against leaving A and Y quite isolated while we plunge into long explanations of X. We must adopt at least a working explanation of Y while we are elaborating X, else the bearing of X upon A will probably be obscured. This will be better understood by an example; the writer quoted is expounding the nature of Narrative:

> A narrative is a representation of a series of events. This is a very simple definition; and only two words of it can possibly demand elucidation. These words are *series* and *event*. The word *event* will be explained fully in a later section of this chapter; meanwhile it may be understood loosely as synonymous with *happening*. Let us first examine the exact meaning of the word *series*.
>
> The word *series* implies much more than the word *succession*: it implies a relation not merely chronological but also logical; and the logical relation it implies is that of cause and effect. . . .[1]

Then the writer goes on or seven pages elaborating the meaning of the term *series*, before he begins to treat of the parallel term. But thanks to his thoughtfulness in supplying us with a working definition of *event*, we are able all the time we are considering *series* to make use of both this term and the term *event* to help us in understanding what the expositor is telling us about narrative.

This anticipatory treatment in which we refer to certain aspects of a subject before we actually deal with them in detail is applicable on a large scale. In planning out a book, for example, the same principles obtain as in planning out a chapter. We are working with a different size of unit, but the principle is the same. This may be illustrated

[1] Clayton Hamilton, *Materials and Methods of Fiction*, p. 44.

by reference to the idea of *unit* itself as treated in this book. In Chapter II. we have a general reference to the idea of the unit of Exposition, in which it is treated in connection with the need for destructive process in preparation for constructive. Then again in Chapter IV. we have the unit regarded as a part of a background, where we have to deal with it at the stage of complexity at which we find it. Finally in Chapter XII. we have a new view of the unit. In that chapter it is used for purposes of comparison. Instead of being something to be analysed out, or to be used as a brick to build up with, it is to be used as a standard by which quantities of all kinds may be measured. It may naturally be objected that it is bad presentation to separate thus the different aspects of the same subject. Why, it may be asked, does not the writer say all he has to say about the unit in one place, and have done with it? But it is all a matter of emphasis. If in planning the book the writer had determined to lay great stress on the notion of the unit as such, then he would have devoted a chapter to this subject, and in that case the contents of some of the other chapters would have had to be distributed throughout the book, as the unit has been under the present arrangement. But even when a special chapter has been set apart for a certain subject, it sometimes happens that an aspect of that subject is better treated in some other connection. Thus though there is a chapter (XIV.) on the Picture, this is limited to the use of the picture as illustration. In Chapter IV. some pages are devoted to the treatment of the picture, but here it is the mental picture that is under discussion, the picture the pupil forms for himself as the result of verbal

description. In Chapter XIV. we are dealing with the picture as something objective, in Chapter IV. as something subjective.

The index of any book one takes up supplies many illustrations of the distribution throughout the text of the treatment of certain subjects that the reader might prefer to have had grouped together in one place. But apart from the fact that we cannot have a book arranged according to the desires of each reader, it has to be remembered that there is a certain compensating advantage in treating the same matter at different stages and in different connections. There is an advantage in familiarising the mind of the reader with a given fact before that fact is brought forward for more or less exhaustive treatment. Novelists frequently introduce a fact two or three times in a very incidental way at the early part of the story in order that it may be the more effectively treated when its turn comes. This principle of casual introduction of matter to be afterwards elaborated may be used by the teacher in two ways. He may imitate the novelist and use this order of presentation in order to build up interest. Several illustrations will be found further on in this chapter, and in the next there occurs a deferred illustration of a generalisation quoted from Herbert Spencer in Chapter III. It will probably be felt that this illustration is not only useful where it is, but that it has an increased force in relation to its original generalisation, because of the delay.

[This paragraph, within brackets, is deliberately introduced in order to explain its own vices in relation to the principles of Presentation. It is thrust in, you will observe, between two sections. The teacher uses a novelist's device in two ways:

one of them has been dealt with, the other is yet to come, and this paragraph is thrust in between them. This is bad, and is only justifiable because it emphasises a defect by calling attention to it at the very moment when it is producing its irritating results. The paragraph originates really in the desire to call immediate attention to a blunder in presentation that has just been made. While it is excellent to refer to something that has already occurred in a book, it is generally a mistake to refer *specifically* to what has not yet been reached. In the preceding paragraph the reader is practically invited to turn to the next chapter and read a particular passage, which he is then to compare with a passage in Chapter III. This not only seriously interferes with the reader's line of thought in this chapter, but spoils the effect of the passage he is invited to read. That passage occurs in a certain connection, where it is assumed it ought to occur. To read it in the first instance apart from that connection is obviously to do it injustice. It is quite different in cases where we are referring back to passages that have been read in their proper order and are now considered in a new connection. The same objection does not lie against the reference in the previous paragraph to Chapter XIV. There is in that case no call to turn to Chapter XIV. at all. Its very title conveys all the information necessary to understand the reference in the text.]

[After reading in typoscript the above deplorable divagation, my colleague Dr. T. Percy Nunn,[1] so

[1] This does seem a most inopportune place, but in the absence of a preface I have no other ;—I want to express my indebtedness to Dr. Nunn for his kindness in reading through, in the very limited time just before going to press, the typoscript of this book, and for the valuable criticism and help he gave.

far from helping me to return to the straight path, led me into temptation by sending me his copy of a work by that Master of Exposition, Sir Oliver Lodge. I looked into the book,[1] and was lost. Sir Oliver's words in the Preface form an admirable commentary on what I have already written :

> Since the book is intended to be useful to the higher class of students, it seemed very permissible to adopt a method which I always use in teaching, viz. to begin by giving *some* ideas at first, and to gradually polish them up later, rather than by attempting a too highly finished statement *ab initio* to overburden and depress, and possibly to confuse, a student. Because of this progressive arrangement, I may be permitted to urge students to *read the book through* before proceeding to dip into it by help of the index, and *before taking notice of references forward which subsequently, it is hoped, will prove useful.* (Italics mine, to emphasise application to the present book.)

Naturally the same principles may be applied in oral Exposition, but with a greater sense of responsibility, as the pupil is entirely in the expositor's hands.]

The second use the teacher may make of the incidental introduction of some matter before it is really wanted is exactly the opposite of the novelist's. He may seek to exhaust the intrinsic interest of matter that is to be afterwards used as illustration. By introducing the attractive matter in unimportant places he allows the pupil to enjoy its interest for its own sake, and when this has been repeated two or three times, the pupil is ready to take a new point of view from the

[1] *Modern Views of Electricity.* Those who are interested in the presentation of this subject will find examples of "anticipations" and "references forward" on pages 16, 17, 28, 42, 90, 94, 96, 98, 99, 105, 128, 144, etc. For an interesting illustration of the preparation for a subject by incidental reference to it in order gradually to build up an interest in it, see Sir Oliver's treatment of the topic "Does electricity possess inertia?" in sections (not pages) 7, 42-8, 88, 89, 98, 105. (References to First Ed.)

teacher, and get up a secondary interest at the proper place.[1]

Sometimes the order of presentation is determined by very practical considerations. In preparing hydrogen it makes some difference whether the pupil is told to pour in the water before he is told to pour in the sulphuric acid. In that form of practical presentation commonly known as "directions" when supplied along with machines, implements, or commodities, the order of presentation is of vital importance. I have seen the pointer of a typewriting machine broken because the direction "Be careful to lower the pointer when replacing the carriage" occurred after the instructions "How to replace the carriage." At the head of every set of practical directions should appear the caution: *Please read the directions right through before beginning to* . . . etc. This naturally raises the question of the help that one part of a presentation gives to another. It may happen that what is obscure when only two elements have been presented becomes quite clear so soon as the third element is brought forward. This involves the problem of suspended understanding during a process of presentation. Is it justifiable to present at a given time certain matters that cannot possibly be understood by the pupils till at a later stage additional matter is supplied? If it is a case of presenting matter that cannot be understood *at all* at a particular stage, but must be got up by memory for use later on, it will probably be agreed that the presentation should not be made. It is different, however, when the presented matter cannot be fully understood at the time of presentation, but will be fully understood when additional

[1] This is illustrated in Chapter XVI. p. 395 ff.

matter is presented at a later stage. Almost all our presentations are open to the objection that the matter brought forward cannot at the moment be fully understood. All that we can hope for is that it may not be misunderstood. From the material supplied the pupils may make premature conceptions that must afterwards be painfully destroyed in order to make way for the correct construction. It is not uncommon to hear post-graduate students, who are being trained to teach the elementary subjects, confess that they never understood the true meaning of what is called simple subtraction till they saw the subject taught in the demonstration school. They often find that they have to break down and reconstruct all their idea-combinations on the subject. So with pupils who have been taught scansion or music on purely mathematical lines; there comes a period of necessary reconstruction when they reach the stage of artistic appreciation. Pupils who have had drawing presented to them as a system of fine line copying from the flat have to fight very hard indeed before they can break up the false combinations and by reconstruction attain the freedom to use drawing as a means of expression. Doubtless the reader's own education furnishes him with more than one illustration of this need for reconstruction. There are cases, as we shall see later in the chapter, in which this formation of premature conceptions and their correction may be turned to good account, as a means of strengthening a desired æsthetic or moral effect. But on the cognitive side we must do all we can to secure the correct (not necessarily the complete) conception at the very start.

Taking it for granted that certain orders of presentation are more economical of the pupil's time

and energy than are others, it may be objected that the teacher's business is not to save the pupil's time and energy, but rather to make him expend both. There are those who maintain that the best progress is made by the process of trial and error. The argument is that you know a thing better if you have made your blunders, and found out the truth for yourself. The result is more your own than if it had been pumped into you by a watchful teacher who stood by all the time to prevent the possibility of your going wrong.

In all arguments of this kind there is a slight confusion of thought between the different parts of a teacher's work. The formation of character is one thing, the exposition of a subject another. A man may often be a better, because a stronger, man on account of the difficulties he experienced in acquiring the knowledge he needed. But it does not follow that he knows his subject better because he had to study it under bad conditions. The argument of those who underestimate the value of careful teaching is that the pupils become emasculated, and unfit for any serious study. But surely it is idle to complain that we are doing too much for our pupils. There is a limit beyond which it is impossible to help them at all. Beyond that limit our help becomes a hindrance. To pass that limit is clearly bad Exposition, but up to that limit the more we can help the pupil the better. There always will remain the irreducible surd of individual effort that cannot be eliminated by any amount of external help.

On the other hand, there is the danger that some teachers may regard the giving of trouble as in itself a laudable thing. The implied argument is surely easily disposed of by a *reductio ad absurdum.*

If the increasing of the difficulties of our pupils is an advantage, it would naturally follow that the worse our exposition the better for our pupils. The teacher who provided the worst text-books and made his pupils work under the worst conditions would do them most good. Some teachers actually adopt this attitude, and oppose the introduction of the metric system on the ground that their pupils would lose the enormous advantage of having to cope with those curious vestigial items $5\frac{1}{2}$ and $30\frac{1}{4}$ that adorn our present arithmetical tables. In the course of a recent examination in Education as one of the subjects for a University degree, I set the following question:

> Speaking of the limited educational curriculum in the best days of Greece, Professor Bosanquet asks: "How was so much made out of so little?" What answer would you suggest?

A large percentage of the candidates took occasion to point out that the curriculum was not nearly so inadequate as it appeared. The subjects studied had the advantage of several difficulties that are no longer available in our modern schools. For example, the Greek characters were not only made by the hand and therefore rather clumsy, but they were arranged with no spaces between the words, and to separate out the individual words involved a great exercise of attention and ingenuity, while the fact that the Greek numerals were so awkward to deal with provided still further opportunities for strenuous training.

The truth is that all this pother about the dangers of a soft pedagogy is based upon the assumption that it is possible to make teaching so perfect that nothing is left for the pupils to do. But all that the most skilful presentation can do is

to prevent the pupils from having to waste their time in unprofitable ways of expending their energy, as for example in manipulating antique tables and separating words that should never have been united. The better the exposition the more rapid the progress of the pupils; the only limit to their progress under these conditions being, in fact, the necessary limits imposed by the need of time for consolidation.

For it has to be remembered that a pupil cannot go on indefinitely piling up knowledge, no matter how skilfully it may be presented. However brilliant the natural parts of the pupil, and however skilful the expositor may be, there is a limit to the speed at which a pupil can master a subject. Even the plain practical man admits this, though with obvious regret. It is with reluctance that he acknowledges that we cannot put old heads on young shoulders. There are no doubt sound psycho-physical reasons why even an Isaac Newton requires a certain minimum of years before he can deal with certain mathematical problems. For our present purpose it is more important to observe that all mental processes involve a certain expenditure of time. Natural processes may be greatly accelerated in a forcing house, but even in a forcing house a minimum time limit is imposed. Stupid pupils demand a long time,[1] but even the cleverest, when treated under the most favourable conditions, must have a minimum time to consolidate

[1] Experienced coaches have great faith in the efficacy of time in removing difficulties. Dr. David Rennet, the distinguished mathematical coach at the University of Aberdeen, whose success in preparing for examinations is phenomenal, is sometimes encouraging to dull but earnest pupils when they are worsted by a problem even after it has been explained. His remark is: "Aweel, than. Ye must juist wait till it sipes [soaks] in."

their gains. There is no fear of excessive speed through excellent Exposition.

The figure of the forcing house brings forward another aspect of the objection that deserves treatment, since there is a basis of truth underlying it. Some writers want to know whether by this very carefully prepared Exposition we may not weaken the power of initiative of our pupils and make them incapable of learning anything for themselves. It is pointed out that certain schools that have specially laid themselves out to prepare pupils for examinations have reduced the art of Exposition to such a state of formal perfection that nothing is left for the pupils to do. But Cramming and Exposition are different things. The crammer's aim is to get his pupil to reproduce under unhealthy conditions a certain amount of information. He is not concerned how the matter is retained, so long as it is there when called for; nor whether it is understood or not, so long as it can be put down on paper without betraying any lack of comprehension. The aim of the expositor, on the other hand, is frustrated if the pupil does not understand the matter presented. But surely the more easily the pupil can be made to understand, the better. It does not follow that the most direct rectilinear Exposition is the easiest in the long run. Everything has to be judged by the kind of understanding attained. But assuming that our aim is the highest form of understanding, then it may be taken for granted that the easiest way to attain that form is the best. To deny this is to assert that labour and trouble are in themselves desirable. If there is any suggestion about "their value as training," etc., it is a sufficient reply that all this is already discounted when we have accepted as our

aim the highest form of result. It is for this reason that the expositor is entitled to use contrast and even contradiction, if he can show that these are better means of expounding his subject than straightforward presentation of facts that are easily assimilated. Under certain conditions it may be desirable to go against the principle of economy on which Spencer lays so much stress. But in all such cases it will be found that we are keeping to the spirit of Spencer's principle, though we reject the letter. It is well to follow the line of least resistance, but naturally everything depends upon where one wishes to go. The means are relative to the end; it is another case of the longest way round being sometimes the shortest way home.

When Nathan led the unsuspecting David to condemn himself in the person of the robber of the one ewe lamb, he was supplying us with an excellent example of a "premature conception" that had to be destroyed and reconstructed before the prophet's exposition was successful. But obviously the result was worth the expenditure of time and energy. Indeed it may fairly be said that, to attain the result the prophet had in view, the round-about way was the line of least resistance. An intellectual understanding of the case could no doubt have been secured in David's mind without this troublesome reconstruction, but the prophet wanted something more than mere intellectual consent.

In Nathan's case the matter was so skilfully presented that there was no room for error. The reconstruction was not called for till the very moment it was needed, and the first construction did not in itself in any way conflict with the effect of the second. But the greatest care is necessary to prevent the first construction from making the second

impossible. An amiable old gentleman was called upon to propose a vote of thanks to the Chairman and the Governors of a great School at the distribution of prizes. Tired of the conventional way of doing what was expected of him, he thought he would introduce an agreeable variety by emphasising the brighter side of a Governor's office. Accordingly he pointed out that though the duties of a Governor were very exacting, and involved a great expenditure of time and energy, the Governors were very well paid for it. He had intended to round off his speech with a glowing account of the joys of being kept young by constant contact with the fresh young life that he saw before him, and of being cheered by the glow of good work well done, and a number of other compensating satisfactions that come by way of reward to the conscientious Governor. But at the mere words "well paid for it" there arose such a murmur of protest among the assembled Governors that the remainder of the amiable gentleman's speech consisted of a hurried explanation that "that is not what I meant."

This unhappy gentleman applied unskilfully an artifice that is quite legitimate in Exposition. He sought to create a vacuum for a fact that he proposed to present. He knew that his remark would excite a certain amount of surprise which would in its turn lead to a curiosity that he would then proceed to satisfy. He had not calculated on surprise passing over into indignation instead of into curiosity. With the less personal issues raised in instruction in school it is often desirable to apply this principle of the vacuum. If the teacher can create the desire for a particular bit of knowledge, he is on the way to the best possible presentation of that knowledge. The following

example from actual teaching illustrates what is meant. It is taken from the essay of one of my students at the University of London:

> I was teaching a class to scan the hexameter line in Latin, and after teaching the division of the line into six feet, two beats in each foot made by either dactyl or spondee, and the invariable nature of the fifth and sixth feet, I put up some lines on the board for us to work out together. The pupils got on swimmingly for the first line, as the lengths of the syllables were well known to them; but the second line was:
>
> Mutat terra vices, et decrescentia ripas.
>
> Working backwards, they arrived at all the feet except the first, and there they stopped in difficulty. Only two syllables were left for this foot, and they had been carefully taught that the third person singular present indicative of the four conjugations was short. Was the foot a trochee $- \smile$? That was the time for the explanation of "vowels long by position," which would have been imperfectly comprehended if given before the children had found the difficulty for themselves.

Leaving to specialists the decision of the question whether scansion should ever be taught in this way, whether in direct or in inverted order, it is necessary to point out, what the student herself discovered after sending in the essay, that the application of the vacuum here involved the fallacy of assuming that the pupils would make *et* long by position in order to get into difficulties at the end, so as to be led to inquire into the very rule that they had already applied. The student's reply was that her plan worked: she desired to get the pupils into this difficulty, and she succeeded. Obviously the excellence of the plan is not diminished by the fact that a more suitable verse[1] was not chosen.

[1] The verse:

> Scindit se nubes, et in aethera purgat apertum

would have led to the desired result, and would have had the additional advantage of including a third person singular (*purgat*) that follows the usual rule, and therefore emphasises the difference in *scindit*.

The principle of the vacuum may be usefully applied in the introduction of new technical terms. If at the beginning of teaching geometry we speak a great deal about "the line joining the opposite angles of a square," the pupils will get tired of the cumbrous phrase, and when the term *diagonal* is introduced will welcome it as a relief from the wearisome description. In Science teaching the principle may be applied by giving half a dozen applications of a certain rule, *e.g.* different phenomena resulting from the pressure of the atmosphere, without enunciating the rule till the last application is made. By this time the pupils want to know what is the cause of the peculiar phenomena they have seen, and are glad to have such an economical arrangement as one principle (whether given by the teacher, or, better, discovered by themselves) to explain half a dozen remarkable things that at first appear altogether different from each other.

Sometimes the principle is more deliberately applied. A certain problem is stated and various more or less plausible solutions are offered one after the other, and each dismissed in turn as unsatisfactory. But all through the discussion there is constant reference to the true theory. Phrases like the following are scattered throughout: "as we shall see presently"; "when we come to what we hold to be the true theory"; "as will be evident in the light of the theory about to be presented"; "a natural mistake in a writer who has not the information that is about to be laid before you." For example, the lesson may be on those curious medallions that the antiquarians of the seventeenth and eighteenth centuries called *contorniates*. The unskilled would naturally regard them as coins. People who know more are aware that this is not

so, and various theories as to their nature have been held, such as (1) amulets to bring success to competitors at the games; (2) tickets to reserved seats at the games; (3) lots to determine the starting order in the chariot races; (4) medals indicating success in the games. Now the teacher starting with the view that the true use of contorniates was to serve as "men" in certain table games resembling our "draughts," keeps this in view all the time he is discussing the other theories, and takes every opportunity of shadowing it forth without actually stating it. While pointing out all the difficulties of the other theories, he refers to "the better supported" theory, "the clue is to be found in M. Froehener's brilliant suggestion,"[1] "before what we believe to be the true solution was offered." By the time the Froehener theory is actually presented a real need for it has been created. The pupil is tired of indirect suggestions, and welcomes the positive statement of the final theory.

There is one limitation to the application of the principle of the vacuum in Exposition. The pupil should not be *taught* anything that is actually false. In using contrast and in preparing a vacuum, error is introduced, no doubt, but in the first place it is not taught as truth, and in the second place the error is only relative. It must be associated with a certain amount of truth before it can have any value in a process that seeks to pass from apparent truth to a nearer approach to ultimate truth. There has to be reconstruction, perhaps, but the original construction is usually correct for some other set of circumstances, though unsuitable for the present. There can be no justification in pre-

[1] *Annuaire de Numismatique*, 1894, p. 88; quoted by K. A. Macdowall, in the *Numismatic Chronicle*, Fourth Series, vol. vi.

senting matter that is, so far as we know, false under all circumstances. We want the pupil to get at the truth as it is known to us, and though we may find it desirable to contrast his view of truth with ours, we need never present actual falsehood to him.

We must distinguish between falsity and mere incompleteness in presentation. "An instrument for telling the time" is an incomplete but not a false definition of a watch. Many teachers are willing to allow an incomplete presentation of ordinary terms, but draw the line when technical terms are in question. Dr. Nunn tells me he is frequently challenged by his students for giving "wrong" meanings to scientific terms. For example, he deliberately calls a mass of peroxide of lead, whatever its size, a "molecule"; and when, under heat, it gives up just the amount of oxygen to enable it to become litharge, he says it has given off one atom of oxygen, and is now a molecule of litharge, made up of one atom of oxygen and one atom of lead. This scandalises his young men, who have been brought up in the belief that size (or rather lack of size) is of the essence of molecules, and particularly of atoms. My colleague defends himself by maintaining that his meanings are not wrong, but merely incomplete. He believes that the qualitative approach gives the students a much better chance of getting the true meaning than does the quantitative. In the ordinary presentation the pupil is thrust into the middle of a theory, before he realises the facts of the case. In very many instances he is so busy whipping up his imagination in the pursuit of the inconceivably small, that he has no energy or interest left to attend to what after all are the essentials of the

laws of chemical combination. It is always wise to *begin* with the proper point of view, where it is possible; and in this case it is not only possible, but actually easier than what may not unfairly be called the metaphysical approach.

We should teach by good example rather than by bad, by showing what should be rather than by showing what should not be. Positive teaching is always better than negative. The "awful example," as it is called, is bad Exposition unless under conditions in which there is no doubt as to the right and the wrong. To write the word *feild* on the blackboard and enlarge on the heinousness of spelling it in that way, only strengthens the chances of that form of the word reappearing in the pupil's exercise-books. There is no self-interpreting standard compared with which *feild* will stand out as inherently bad. In certain forms of symmetrical freehand drawing, on the other hand, common errors made by the pupils may be with safety placed upon the blackboard, since their very juxtaposition to the model will at once condemn them. There is here an objective standard to which appeal may be made with no fear of misunderstanding. So with the objectionable paragraph on pp. 203-204 of this chapter. It carries its own condemnation with it.

In dealing with grammatical errors, the type should be: "The correct form is 'Charles and his cavaliers *were* defeated.'" The emphasis on the *were* calls attention to the fact that this is correct, without recalling the incorrect *was* of the exercise-book. Even in a case of greater difficulty where there might be room for a little argument it is well to stick to the positive form. "Charles with his cavaliers *was* defeated." If the pupils themselves

raise objections, a little argument may be permitted, but even then the repetition should always be of the correct form, and not of the alternative *were* as suggested by the pupils. Reiteration of the right should be the expositor's principle, rather than condemnation of the wrong.

Some teachers set what they call mistake-traps, in order to illustrate certain forms of error. The conditions here should be the same as in the case of the awful example. Traps should never be set unless there is an objective standard to which the wrong answer may be referred. These traps are legitimate only in those cases in which matters can be so arranged that not only shall the expected mistake occur, but it shall bring its own condemnation with it by confronting itself with some irreconcilable ideas that make investigation, and consequent reconstruction, inevitable. It may be conceded that so long as a mistake-trap leads the mistake-maker to perceive and rectify his mistake, no harm is done. But it is at the best a dangerous form of exercise, and when used should always be followed by a series of exercises leading to normal results, so that the final impression left on the pupil's mind is the correct one.

It is a favourite charge against the average teacher that he is too fond of rules. But, after all, in his mind the rule occupies only the second place. His real first love is the exception. All his professional activities seem to centre round exceptions. His pupils indeed acquire from the teacher's bias a distorted view of the relative values of rule and exception. The following dialogue from real life is full of instruction :

Teacher. (Going over examination paper of pupil—subject French Accidence). I see you have given *générals* as the plural

of *général*. Don't you know that nouns in *-al* form their plural in *-aux*?

Pupil. Yes, sir, but I thought it was an exception.

T. But what made you think it was an exception?

P. Because it was set in the examination, sir.

To the same effect is the advice given by the Scotch Dominie to the promising pupil whom he is sending up to the Scholarship Competition at Edinburgh University:

"When in doubt, mind [remember] that practically everything in an Examination governs the subjunctive."[1]

No doubt the demands of examinations have had a great deal to do with the unhealthy prominence given to exceptions. Examiners who are more anxious to show what a candidate does not know than to find out what he does, have naturally a warm side to exceptions. But the teacher too is not without guilt. His besetting virtue is accuracy, and he cannot bear that even for a time his pupil should be told something that will not bear the fullest investigation. No sooner has he enunciated a general principle than some wretched exception occurs to his mind, and he proceeds with indecent haste to modify his original statement by indicating in what respect it comes short of absolute truth as known to him. Before the rule has time to be established, its authority is undermined. The old Latin Grammars were grossly disloyal to their rules. In a couple of lines they describe the behaviour of nine-tenths of the words under a particular category, and then having eased their conscience and having got rid of the herd of commonplace words, they proceed to the real business of life and wallow in exceptions. The

[1] Ian Hay, *The Right Stuff*, p. 6.

exceptions have of course a place in teaching. Fine scholarship is determined, no doubt, just by the accuracy with which the exception is treated. But in a procession, mere precedence does not determine the importance of the people. In some processions the important persons come first, in others last, in the majority the important place is somewhere in the middle. It does not, therefore, degrade the exception to say that its place is at the tail of the procession. The rule must be thoroughly well established before the exception can come into being. We may in certain forms of teaching pass from the example to the rule. But we cannot pass from the exception to the rule. For if we try to do so, what happens is that we for the time being erect the exception into a rule, and then bring in the rule as an exception.

The true order of presentation is first of all to enunciate the rule, then to support it. The rule may be either given, as in deductive teaching, or worked for, as in inductive. In either case it must be buttressed up with many examples, and not weakened by any exceptions. In the case of inductive teaching the rule is really built up on examples. In deductive teaching it is justified by the examples adduced. The rule should be applied in many ways, all involving normal examples of its working. By and by the pupil acquires confidence in his rule, and treats it as a part of the nature of things. Then the teacher may either introduce an exception, or merely permit his vigilance in editing examples to relax, and allow an exception to occur in the ordinary course of study. Whether the exception occurs by accident or is deliberately introduced by the teacher, the detection of the exception must be left to the pupil. Unless the pupil

is struck by the exception, as an exception, the rule has not been properly assimilated. When the pupil comes to complain about the rule failing in a particular case, he is in a position to be told of the nature and number of the exceptions for which he must be prepared. It will be noted that the pupil's complaint in the first instance will not be against the rule, but against the exception. His first attitude is and ought to be to regard the exception as a blunder on the part of some one or other.

Obviously there are cases, especially in dealing with older pupils, when it may be permissible to introduce rule and exception together. This is especially true when the rule has been reached by an examination of a great series of examples, and when the number of exceptions is limited. Suppose the pupil has, after much turning up of the dictionary, come to the conclusion that most German substantives that are dissyllabic and that end in *e* are feminine, it is desirable to add on the spot the limitation "not denoting members of the male sex," and to give the exceptions *das Auge*, *das Ende*, and *das Erbe*. On the other hand, the ten German substantives now ending in *e* but etymologically ending in *n*, should be left to be discovered as exceptions to this rule and as examples of a rule of their own.

So far we have been dealing with Exposition as it affects the individual mind. The problem is to some extent complicated when we treat of Exposition to a class. The same principles of presentation must of course hold in both cases, but they may have to be differently applied. To begin with, when there are from twenty to sixty minds to be considered (and in the case of public Exposition often many hundreds) it is clear that there is greater

difficulty in getting at the common segment of mental content. In the case of a class doing ordinary school-work there is usually much less difficulty on this score than one might expect. The ground has been already prepared. The pupils are of approximately the same age, they have gone though a similar course, they come from homes that are at least in a general way similar. The difficulty in finding common ground is mainly in connection with outside matters, and is felt chiefly in introducing more or less concrete illustrations. With a really large audience the expositor must adopt the purely human attitude. He must assume in his hearers only the most universal qualities of human nature, and whatever degree of knowledge his acquaintance with the circumstances of his audience may warrant him in assuming as a minimum.

In dealing with a particular mind, we may approach it on one particular side because we know that to be the most accessible. The visual and the audile, for example, would be approached in a different way; but with a class we have to make an appeal that will meet all needs. We may have to approach a subject from several different points in turn, in order that one or other of our approaches may appeal to the different members of the class. We may, for instance, present the matter from five different points of view. It is probable that some of the really capable pupils will appreciate all the five presentations. Others may appreciate only four or three or two or one. It may chance that, after all, there may be one or two in the class who have been impervious to all five modes of approach. These zeros may be safely regarded as unfit for class instruction, and as they require individual treatment may be neglected in our present consideration.

With regard to the others there is the serious problem of interest. Especially if the subject is not in itself difficult, it becomes very tiresome to a clever boy to have it explained in four different ways, after he has mastered it at the first exposition. The same holds of the other pupils for all the explanations given after they have mastered the point at issue. The expositor to a class must therefore lay his account with this danger, and do what he can to introduce a second line of interest that may compensate the quicker pupils for their enforced retreading of the old ground. It has to be remembered that interest does not arise merely in the new or merely in the old, but in the new in an old setting or the old in a new setting. By the conditions of the case the five presentations are made from different points of view, and therefore fulfil to some extent at least the conditions on which interest depends. But in the actual process of teaching it is possible to introduce different lines of interest. The quicker pupils may be taken into the teacher's confidence in the recapitulatory presentations. Questions that the duller pupils cannot answer because they have not yet caught the essential point, may be answered by the quicker pupils to their own satisfaction and to the edification of the duller pupils. What is a line of investigation and discovery for the duller pupils may well be a course of practical applications for those who have mastered the principles at the first or at any rate at one of the earlier stages.

CHAPTER IX

EXEMPLIFICATION AND ANALOGY

NATURALLY Illustration must observe the fundamental principle of proceeding from the known to the unknown. We must approach the little known by means of the better known, and this principle must override all others. Probably the most fundamental mode of Illustration is exemplification, and this is commonly understood to mean the illustration of the rule by the presentation of examples. It would seem to be implied that this form of illustration always proceeds deductively. But while in Exposition we may be said to pass from the rule to the example, in Illustration it would seem that we are really passing from the example to the rule. Of the two, the example is supposed to be better known than the rule, on which, as a matter of fact, it casts light. When we say "*Will* in the first person promises or threatens, and in the second and third persons simply foretells : as, *I will go in spite of all he says. He will come to supper to-night*," we take it for granted that the person we are speaking to knows the shades of meaning of *will* in the two examples as a mere matter of experience of the language, though we do not assume that he knows anything about the grammatical statement of the fact.

But in the actual practice of teaching the example may be just as well illustrated by the rule as the rule by the example. Everything depends upon which is better known to the person we are dealing with. It is commoner, no doubt, in ordinary teaching to set forth a general rule and then follow with more or less copious examples. But it is quite as useful to explain a puzzling instance by referring it to the class to which it belongs; in other words, by referring it to the rule of which it is an example. When a boy on the classical side cannot understand the meaning of the word "profaner" in the line

Where no profaner eye may look,

the master may make matters quite clear by merely uttering the words "Latin comparative." What he has done is to refer this troublesome example to a rule that he knows is familiar to the pupil. When a less experienced doctor calls in a more experienced one to diagnose a difficult case, the mere mention of the disease by the older practitioner settles the matter by referring the case to the rule of which it is an example. Every time that the teacher suggests the particular geometrical proposition that will solve a "rider," he is really illustrating the example by the rule.

When we are told in the dictionary that Illustration means explaining or exemplifying as by means of figures, comparisons, and examples, it would seem that we have a twofold classification of the materials of Illustration. On the one hand, there are comparisons implying likeness and unlikeness; and on the other, there are mere examples that owe their power as illustrations to the fact that they show some rule in operation. But, after all, the very fact that the different examples illustrate

the same rule proves that they have something in common, and that therefore the idea of resemblance is present in them also. Aristotle distinguishes between them, calling reasoning by example *paradigm*, and reasoning by resemblance *analogy*. In paradigm we reason from one example to another; but in analogy we reason from a more clearly stated resemblance. With Aristotle analogy is treated as equivalent to mathematical proportion, which involves the equality of ratios.

Our whole experience is intelligible only on the assumption that the operations of mind and matter are regulated according to certain laws that act uniformly. The law remains the same though the cases of its application vary as to what may be called content. When, therefore, we find a particular law acting in connection with one content, we assume that the same law will hold under similar conditions in connection with another content.[1] The selection of the common element from two disparate cases is naturally very difficult. For purposes of Illustration, therefore, it is well to adopt the Aristotelian view of analogy as limited to the equality of ratios. This enables us to express all illustrative analogies in mathematical terms as thus $a : b :: c : d$. Now if a has the same relation to b that c has to d, and the pupil knows *either* the relation that a has to b *or* the relation that c has to d, the teacher is in a position to illustrate the unknown relation by a reference to the known. In the case in which the pupil knows both of the

[1] It will be noted that we have here an exemplification of the generalisation which Mr. F. H. Bradley warns us is the inevitable result of the analysis of the Law of Identity: "What is true in one context is true in another." *The Principles of Logic*, p. 133.

relations, the teacher is still able to use the analogy as an illustration, but in this case the purpose will be rather the æsthetic satisfaction of the pupil than the clarifying of his ideas.

In ordinary life all that great series of short-hand thinking that is represented by proverbial philosophy is based upon the assumption that metaphor does carry a certain amount of weight as argument. "You cannot make a silk purse out of a sow's ear" may have no direct connection with the case of the nobleman who marries his kitchen-maid; but the plain man is satisfied that when he has quoted the proverb he has said something to the point in this connection. He feels that he has at least made matters clearer, has thrown light upon the subject, has illustrated it.

As metaphor by its very nature deals entirely with relations, it is obviously of the first importance in Illustration. It is in fact in all cases an instance of Aristotelian analogy. The proverb may be represented in purely mathematical form:

Sow's ear : silk purse : : kitchen-maid : noblewoman.

The implication is that the relation between the sow's ear and the silk purse is the same as that between the kitchen-maid and the noblewoman; that is, that the one cannot be turned into the other. As an argument this metaphor is unsatisfactory, and as an illustration its value is mainly æsthetic. It gives satisfaction by stating in a very effective way what a great many people believe to be true. In this case it is assumed that we know both terms of the analogy, but in most cases of what may be called illustrative metaphors in teaching, one pair of terms is assumed to be better known than the other.

We have seen that it does not matter which pair

is known, the only important point being that one pair must be better known than the other. When we speak of being better known, it should be understood that we are referring to knowledge of the relation. For a metaphor to have any illustrative value at all, the pupil must know all four terms as terms, though the true relation between one of the pairs may not be known by him. Naturally the less known relation must take its place as the illustrandum.

There is this further point, that the person using the illustration is supposed to know the relationship between the terms in both parts of the metaphor, and to vouch for the resemblance of those ratios. As a method of discovery analogy may not always be quite reliable, but as a means of illustration there is no justification for its ever misleading, so long as it is skilfully used. The source of error in teaching is quite different from that in discovery.

An illustrative analogy that leads to error usually does so through a process of *spreading* that is characteristic of all untrained minds. It is not enough that the relation between the two terms in the first branch of the analogy is identical with that between the two terms in the second; this relation must be kept within the bounds of the particular analogy. The tendency of the mind is to supply a great many subordinate analogies, and to hold them as of equal importance with the original. In other words, the illustrative analogy is really an abstraction which the ordinary mind tends to make concrete by adding on a great number of qualities to each pair of terms, and insisting that a series of parallel analogies shall hold between the different pairs. Thus Professor James's figure of the stream of consciousness has been condemned, because our thoughts do not pass

once for all through the mind, and never come back. The critic would substitute the figure of a cistern, because the mind is rather a reservoir from which old thoughts can be drawn at will. Obviously the cistern-figure may be condemned in its turn, on the ground that our thoughts do not stagnate like the water in a cistern; while the ideas that we draw from the mind we do not throw away for ever after using, as we do with the water we have drawn from a cistern. An illustration should be a perfect analogy as far as it goes, but it must be limited to the relations that give it meaning. James's figure was introduced to illustrate the fact that the contents of consciousness have bulk; our ideas do not form mere series, but rather masses. This is well brought out by the figure of the river (James, in fact, goes the length of giving a graphic representation of the stream)[1]; but to carry over to the illustrandum the details of the illustration is to court error. One might as well object that our ideas are not wet, as they would necessarily be if they formed part of a river.

The case has been epigrammatically put: "If a metaphor will go with you a mile, do not compel it to go with you twain."

No doubt very elaborate analogies are sometimes used, and worked out in much detail. Our great allegories, for instance, give many excellent examples of analogy skilfully maintained for long stretches at a time. But in all such cases sooner or later the analogy breaks down, and gives an opportunity for the critic to find serious fault. It is here that the deliberately constructed illustrative story or parable calls for criticism. Such stories as Professor Drummond's "Baxter's Second Innings"

[1] *Principles of Psychology*, vol. i. p. 279.

have to be judged from two different standpoints; first as works of art, secondly as more or less consistent analogies, with a moral purpose.

Teaching by metaphor, in spite of Aristotle's praise of that figure,[1] has its dangers, and must be confined to the essentials of the relationship to be illustrated; and in order to keep one metaphor within its proper bounds it is desirable that it should be balanced by other metaphors. The relation between mind and mental content may be illustrated by reference to a river, a well, a reservoir, a kaleidoscope, a blank sheet of notepaper, a stage, a dome, a photographer's plate. Each figure as it is used is corrected by the others, and only the really essential relationship is left in the reader's mind. Each of the figures marks a certain aspect of the truth, but while each emphasises its own aspect, it tends to restrict the application of al the others to their own proper place. The common elements in all the figures fuse, while the peculiarities of each are arrested by the peculiarities o' the others.

This advance by means of fusion and arrest is oten applied in the actual work of teaching. The symmetry of many algebraic results is thus made patent to the pupil without the direct intervention d the teacher. The familiar formula $(a + b)^2 = a^2 + 2ab + b^2$ may be insinuated into the pupil's mind by a series of actual multiplications, the letters being changed in each case. The purely general character of the result soon becomes clear, and the pupil sees that it is unnecessary to do the actual

[1] But the greatest thing by far is to have a command of metaphor. This alone cannot be imparted by another; it is the mark of genius, for to make good metaphors implies an eye for resemblances. *Poetics*, xxii. 9 (S. H. Butcher's translation).

multiplication in order to reach the desired result. The analogy forces itself upon his notice.

In order that a metaphor may have its full value as an illustration the analogy must be completely presented to the mind; *i.e.* both pairs of terms must be given at the same time. Even if each pair is familiar to the mind dealt with, they must be presented together in order that they may produce their proper effect. Unless this is done, the metaphor presents itself not as an illustration but as a problem. This becomes clear if we take one or two examples of the illustration without indicating the illustrandum.

> He clasps the crag with crooked hands;
> Close to the sun in lonely lands,
> Ring'd with the azure world he stands.
> The wrinkled sea beneath him crawls;
> He watches from his mountain walls,
> And like a thunderbolt he falls.[1]

Till we are told that Tennyson is here dealing with the eagle, we experience a sense of discomfort. The natural effect of the personal pronoun is to suggest a human background for the presented ideas, and we find it difficult to make a picture that will satisfy us by combining in a reasonable way all the materials supplied. So soon, however, as we get the key to the problem, we find a great deal of pleasure in tracing out the parallelism. Given a relation, it is not very difficult to find a parallel that will illustrate this relation.[2] But given

[1] A Fragment, *Tennyson's Works*, 1883, p. 134.

[2] Jean Paul Richter appears to take a different view in the following passage from the *Vorschule der Aesthetik*, Programm IX., section 50:—"Geht ein Dichter durch ein reifes Kornfeld spazieren; so werden ihn die aufrechten und körner-armen Aehren leicht zu dem Gleichniss heben, dass sich der leere Kopf eben so aufrichte . . . aber er wird einige Mühe haben, für denselben

an illustration, it may be almost impossible to find the original relation which is to be illustrated, though when the relation is discovered the beauty of the comparison may be easily appreciated. The mental process is different in the two cases. In appreciating the comparison we are dealing with perception and apperception; in seeking for the relation that is illustrated we are dealing with discovery. In the first case, we have to follow a lead that is given; in the second, we have to pass from an effect to a cause, where many causes may lead to the same effect, and yet only one cause will meet the case in point. Take the following example of a series of metaphors referring to an historical character:—

> That grand impostor, that loathsome hypocrite, that detestable monster, that prodigy of the universe, that disgrace of mankiud, that landscape of iniquity, that sink of sin, and that compendium of baseness . . .

This has the air of being a comparatively easy case. It would appear that from the superlative nature of the figures used there could hardly be two men in the world who could fill the part. Yet if this description is proposed to a class of senior pupils as a problem, it is astonishing how many

Gedanken eines zugleich unbedeutenden und doch stolzen Menschen in den unabsehlichen Körper-Reihen auf den Schieferabdruck jener Blume zu treffen." But everything depends upon the state of the mental content of the person concerned. If the teacher asks a class what the haughtily upright but poorly filled ears of corn make one think of, it is quite likely that he will get several pupils to suggest empty-headed pompous people, but by emphasising the two qualities of emptiness and stiffness he has really suggested the comparison. On the other hand, if he asks a class to find an illustration among plants of an insignificant but pompous person, not many of his pupils would suggest corn at all, but there would be little lack of quite suitable comparisons with other plants, mainly flowers.

fairly intelligent attempts may be made without any pupil hitting upon the truth. King John is often selected; Nero is a favourite suggestion; and Judas Iscariot may by many be regarded as a better answer than the real one. We require the further hint that the words are those of the stout old cavalier Sir Henry Lee[1] before we can apply them to Oliver Cromwell.

As soon as we have found the key, we see how true the comparison is—from Sir Henry's point of view. But in the following example, from one of Charles Lamb's essays, we have a series of epithets that are in most cases wonderfully apposite. When we know the subject referred to, we admit that at least twenty of the twenty-seven metaphors are admirably suited to illustrate that subject. Yet, after reading these twenty-seven illuminating metaphors, most readers who have not been told the subject beforehand find it impossible to discover what they all refer to. That is to say, that a given relation is illustrated by twenty-seven parallels—of which at least twenty are excellent—without making it possible for the average man to find out what that relation is. The reader probably remembers the essay in question, but he cannot do better than try the experiment of reading to his most intelligent friends (or to a class if one is available) the following description, and asking them to say what is the subject of the first *is* :—

> . . . is the most irrelevant thing in nature—a piece of impertinent correspondency—an odious approximation—a haunting conscience—a preposterous shadow, lengthening in the noontide of our prosperity—an unwelcome remembrancer—a perpetually recurring mortification—a drain on your purse, a more intolerable dun upon your pride—a drawback upon

[1] Scott's *Woodstock*, chap. xxv.

success—a rebuke to your rising—a stain in your blood—a blot on your 'scutcheon—a rent in your garment—a death's head at your banquet—Agathoeles' pot—a Mordecai in your gate, a Lazarus at your door—a lion in your path—a frog in your chamber—a fly in your ointment—a mote in your eye—a triumph to your enemy, an apology to your friends—the one thing not needful—the hail in harvest—the ounce of sour in a pound of sweet.

In spite of the cumulative effect of twenty-seven broad hints, you will almost certainly find that your friends or pupils fail to arrive at the true subject. This looks as if Lamb's ingenious series of metaphors was of little value in illustrating his subject. Yet the moment the reader or hearer knows that this subject is *A Poor Relation*, he finds that every one of the epithets does something towards clearing up his ideas on the subject. The process of selecting from each of these figures the element that is common to all—the fundamental relationship—is of the utmost service in throwing light upon the relationship.

In his essay, Lamb mercifully begins with the subject, so that his epithets are read with pleasurable interest. Sometimes, however, a writer, but more frequently a speaker, deliberately uses a suppressed subject in order to enhance the interest of his words. This is obviously a special application of the principle of the vacuum, and, if skilfully applied, the method is quite justifiable. It is a challenge from the speaker to his hearers, and a great part of the charm of the problem is the activity it encourages within narrow limits. As a problem it should be presented in such a way as not to be so difficult as the passage from Lamb would be if uttered in its present form before an audience. It must be possible for the abler among the audience to solve the problem before the passage is completed.

More or less broad hints should be given throughout, and the circumstances of the case should also supply a certain guidance. It will be readily admitted that these hints have a tendency to help each other, so that their influence is cumulative as in the parlour game of "Lights," in which two persons begin talking round some subject that is not revealed to the rest of the company. The subject is never mentioned by name, but each person who thinks he has guessed it from what he has heard of the conversation, joins in and tests by the relevancy of his remarks whether his guess is right or wrong. Obviously the longer the conversation lasts the greater the chance of the auditors to discover the subject, but all the time their wits must be actively employed if they hope for success.

An excellent example of this form of illustrative teaching is supplied by an address given by Dr. William Osler to medical students. The reader should experiment with himself and note the exact point at which he guesses the word, and the point at which he is sure that his guess is right. In order to prevent the possibility of the reader's eye catching the actual word it is represented by a dash in the text, but is given in a footnote that will be found when the page is turned :—

THE MASTER-WORD

It seems a bounden duty on such an occasion to be honest and frank, so I propose to tell you the secret of life as I have seen the game played, and as I have tried to play it myself. You remember in one of the *Jungle Stories* that when Mowgli wished to be avenged on the villagers, he could only get the help of Hathi and his sons by sending them the master-word. This I propose to give you in the hope, yes, in the full assurance, that some of you at least will lay hold upon it to your

profit. Though a little one, the master-word looms large in meaning. It is the open-sesame to every portal, the great equaliser in the world, the true philosopher's stone, which transmutes all the base metal of humanity into gold. The stupid man among you it will make bright, the bright man brilliant, and the brilliant student steady. With the magic word in your heart all things are possible, and without it all study is vanity and vexation. The miracles of life are with it, the blind see by touch, the deaf hear with eyes, and the dumb speak with fingers. To the youth it brings hope, to the middle-aged confidence, to the aged repose. True balm of hurt minds, in its presence the heart of the sorrowful is lightened and consoled. It is directly responsible for all advances in medicine during the past twenty-five centuries. Laying hold upon it, Hippocrates made observation and science the warp and woof of our art. Galen so read its meaning that fifteen centuries stopped thinking and slept till awakened by the "De Fabrica" of Vesalius, which is the very incarnation of the master-word. With its inspiration Harvey gave an impulse to a larger circulation than he wot of, an impulse which we feel to-day. Hunter sounded all its heights and depths, and stands out in our history as one of the great exemplars of its virtue. . . . Not only has it been the touchstone of progress, but it is the measure of success in everyday life. Not a man before you but is beholden to it for his position here, while he who addresses you has that honour directly in consequence of having had it graven on his heart when he was as you are to-day. And the master-word is ——*, a little one as I have said, but fraught with momentous sequences if you can but write it on the tablets of your hearts, and bind it upon your forehcads.[1]

These one-sided metaphors illustrate clearly what Aristotle means when, after praising the use of metaphors as indicating high intelligence, he goes on to say that as a style made up entirely of strange or rare words is a jargon, so a style made up entirely of metaphors becomes a riddle.

For the essence of a riddle is to express true facts under impossible combinations. Now this cannot be done by any arrangement of ordinary words, but by the use of metaphor it can.[2]

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[1] *Aequanimitas and other Addresses*, p. 373.

[2] *Poetics*, xxii. 2.

There arises here an interesting application of the principles of the order of presentation. It is clearly important for the illustrator to determine whether he ought to begin with the illustration or the illustrandum. Logically the main idea should come first and the illustrative matter should follow. But it is interesting to observe that in actual practice the poets are rather fond of inverting this order. "As" is the natural beginning of a poetical comparison, and the illustrandum is generally held back till the correlative "so" introduces it. We are sometimes told that in the poet's own thinking the process is reversed, but it is very probable that in the case of our finer poets the figure frequently precedes in thought as it precedes in expression.[1] In any case it suits the poet's purpose to put the figure in the foreground when he is making his presentation :—

> Thus presented, it gives more cohesion to the poetic period, rouses curiosity, holds it in suspense to the end ; one must get to the second part of the period in order to understand its meaning ; in place of which if one presents the principal idea at first, the figure coming afterwards not being expected will have the effect of a mere afterthought [*hors-d'œuvre*].[2]

It is clear that we are here dealing with the æsthetic use of illustration. But when we come

[1] The account of the manufacture of *The Raven* in E. A. Poe's fascinating essay on *The Philosophy of Composition* must be taken with some caution. No doubt some poems have been built up in this way ; but they are not of very high rank. The essay is full of value for the didactic illustrator, but is of little use to the poet. Poe has the didactic instinct very strongly developed. Probably he was not thinking of himself when he wrote : "It is the curse of a certain order of mind that it can never rest satisfied with the consciousness of its ability to do a thing. Not even is it content with doing it. It must both know and show how it was done." *Marginalia*, xlvii.

[2] Paul Souriau, *La Suggestion dans l'Art*, p. 227.

[* Work.]

to the didactic use we must bring the illustrandum into the first rank. Here the purpose is not mere enjoyment, but clear thinking; not a conundrum, but an exposition. Till he knows what is being illustrated, the pupil cannot understand the illustration as illustration. Accordingly he is exposed to all the temptations to set up premature conceptions, and will thus have to do over again all his thinking as soon as he finds the real point at issue. This is precisely what we have seen in the previous chapter is to be specially avoided. No doubt in the process of discovery and invention we are frequently thrown out of our reckoning, and have to rethink our thoughts. But when we are being taught in the sense of having something expounded to us, we have a right to expect that we shall not be misled by the person who professes to be our guide.

In teaching it may be desirable, as a general rule, to pass from particular cases to general conclusions or principles. But there are cases in which it is better to start with a clear statement of the principle and then proceed to illustrate it. An excellent example of the clear statement of a principle followed by a very ingenious illustration is to be found in Part III. of De Quincey's *Essay on Style*. Starting from the principle which he finds in Paterculus that there is a tendency of intellectual power to gather in clusters, he illustrates this summarily by referring to the three great periods in our own Literature: the Elizabethan, the Queen Anne, and the period beginning with Cowper; and then proceeds to give one of the most ingeniously manipulated illustrations to be found in English. The two great clusters of Greek intellect centre each round one man; the first round Pericles, the second round Alexander of Macedon. "On good reasons, not called for in this

place," he tells us that the year 444 B.C. is the most suitable locus for Pericles, while the *annus mirabilis* of Alexander's life was the year 333 B.C. The Pericles cluster is thus described :

> First eomc the three men *divini spiritus*, under a heavenly afflatus, Aesehylus, Sophocles, Euripides, the ereators of Tragedy out of a village mummery; next eomes Aristophanes, who breathed the breath of life into Comedy ; then comes the great philosopher Anaxagoras, who first theorised successfully upon man and the world. Next eome, whether great or not, the still more *famous* philosophers, Soerates, Plato, Xenophon ; then eomes leaning upon Perieles, as sometimes Pericles leaned upon *him*, the divine artist, Phidias ; and behind this immortal man walk Herodotus and Thueydides.

The Alexandrine cluster is not quite so brilliant, but De Quincey makes capital play with the two central figures Aristotle and Demosthenes. Next come Lysippus the sculptor and Apelles the painter. No other names are mentioned ; a testimonial to De Quincey's honesty. Names could be easily given, but as they do not stand for men of quite the same rank as the men of the Periclean cluster, we are merely told that "there are now exquisite masters of the more refined comedy," and "historians there are now as in that former age." Pericles is well balanced by "Alexander himself, with a glittering *cortège* of general officers well qualified to wear the crowns which they will win."

Having now got his two clusters, De Quincey proceeds to unite them under the figure of the two balls of a dumb-bell, the cylindrical bar joining them being represented by the orator Isocrates, *pater eloquentiae* and *communis magister oratorum*, Milton's "that old man eloquent" who, thanks to weak lungs and constitutional cowardice, contrived to keep out of trouble long enough to have a personal acquaintance with the great men of both clusters. The aged

orator had seen twenty-four Olympiads, and therefore quite satisfactorily bridged the 111 years that separated 444 B.C. from 333 B.C. It would be difficult to find a more ingenious and—perhaps with the exception of that suppressed reason for the choice of the date 444 B.C.—a fairer illustration of Paterculus's thesis. Every experienced teacher will appreciate its practical value.

While a material illustration like that of the dumb-bell is frequently very effective in such a connection as that in which De Quincey uses it, we get greater help from it when we keep to the region of the material. There it has a compelling power that it lacks in more abstract connections. It would require a very great deal of writing to convey the same accurate effect as is produced by the following illustration :—

> The battle was fought as though the British troops were travelling along the radii of a fan, of which the French constituted the outer circumference. As the fight progressed, the fan commenced to contract.

There is unfortunately an ambiguity involved in the one word "contract." As a matter of experiment with an intelligent class of students (age 21-24) I found that about a third regarded the figure as implying that the fan began to get smaller from tip to circumference, or in other words by the diminution in the length of the radii. The substitution of the word "close" for "contract" removes all possibility of misunderstanding the expositor's meaning. A figure like this is a sort of undrawn diagram. A few lines on a blackboard would make the matter equally clear, but in cases where a certain shape is fixed in the minds of the pupils, it is quite legitimate to use that as a standard. For example, in describing

the position of the British forces in Natal at the beginning of the Boer war a newspaper correspondent asked his readers to treat the mountain system as a giant letter A, with the apex pointing north. Then he proceeded to give the position of Ladysmith and other towns within the letter, using such terms as the bridge of the A, the left leg of the A, the enclosed triangle of the A. Such figures have a compelling power that directs the mind of the pupil whether he will or no.

On the other hand, such figures must be very definitely presented. I have seen considerable confusion arise in a junior class from the statement that the watershed of England was shaped like the letter T, since the teacher had to explain first of all that the top of the T was not quite straight but somewhat squinted; and further, that the top of the T was at the bottom of the map. In fact, the T was standing on its head. The same illustration succeeded much better in another case where the teacher began at once by saying that the watershed was like a capital T turned upside down. The minor differences were introduced when the pupils were familiar with the figure as a whole.

It often happens that when a generalisation has been stated, the pupil understands it in a broad way, but is not quite sure as to its application. If the generalisation is followed by one or two examples, the pupil has the opportunity of testing how far his impressions are right. Sometimes the examples show him that he has taken up a wrong view of the meaning of the rule; but even when he has not to change his first view, he feels a great increase in confidence from having seen the rule in action. A capital instance of such a useful illustration is to be found in the continuation of a passage quoted from

Herbert Spencer in Chapter III. of this book. If the reader will turn to the passage referred to and re-read it,[1] he will find that the following passage adds considerably to the clearness of the otherwise very satisfactory exposition :—

> Under a clear sky, and with no trees, hedges, houses, or other objects at hand, shadows are of a pure blue. During a red sunset, mixture of the yellow light from the upper part of the western sky with the blue light from the eastern sky, produces green shadows. Go near to a gas lamp on a moonlight night, and a pencil placed at right angles to a piece of paper will be found to cast a purple blue shadow and a yellow shadow, produced by the gas and the moon respectively.

It is now easy to admit what was suggested at the beginning of the chapter, that even when we are dealing with the most common form of illustration, the supplying of an example to make clear the application of a rule, we are still working within the realms of analogy. The example owes its value to the fact that it is in at least one point like all other examples of the principle it exemplifies; any example of the working of a rule embodies the essential relation implied in that rule, however different the terms between which the relation exists.

When we deal with the type as illustration we have a special case of the illustration of the rule by example. It may be maintained not unreasonably that the type really combines in itself the rule and the example; it may be said to be a definition become concrete. It corresponds to all that is essential in the rule. Suppose we are dealing with insects, for instance, any insect will serve for a mere example. But only certain insects possess all the essential elements that go to the formation of the

[1] Page 75.

complete connotation of "insect." No insect is, as a matter of fact, a perfect type of the class, but the cockchafer is usually selected because he combines all the essential qualities, though some of them are present only in a rudimentary form. Sometimes it sounds inappropriate to speak of a type at all. Red is no more a typical colour than is any other. It would be difficult to quote a typical sentence. "What is nobler than to die for one's country?" has no more right to be regarded as a type than has the homely "Cows eat grass." But when we come to special kinds of sentences—exclamatory, interrogative, declaratory—we may well have a type. Having defined a loose and a periodic sentence, it is quite easy to select a sentence that is typically loose, and another that is typically periodic.

In dealing with the type it is well to make it as abstract as the conditions of the case admit. The typical insect must have a particular colour, since we cannot have a real tangible insect without colour of some sort. But of this colour abstraction should be made in applying our type as illustration; and as colour is one of the most attractive qualities, we may find this abstraction difficult. On the other hand, in dealing with the various kinds of sentences, we find it easier to be abstract. "That *a* is *b*, that *c* is *d*, that *e* is *f*, that *g* is *h* cannot be questioned" is a typical periodic sentence. "He denied that *s* is *t*, that *u* is *v*, that *w* is *x*, that *y* is *z*" is an equally typical loose sentence. The advantage of expressing them in this abstract form is that the attention is directed to the essential point without being drawn off to the matter which might be in itself interesting.

While the type as illustration should be made as

abstract as possible, this abstractness should not be suddenly introduced. There is an important difference here between the beginning and the ending of a process of learning. Illustrative examples at the beginning of a process may be more or less concrete with proper precautions against their monopolising an illegitimate amount of interest. When the stage of the particular has been mastered, the results may be well fixed in the pupil's mind in its barest form by means of an abstract type. When we are using the abstract at any rate, it is well to be as abstract as possible. The introduction of a little of the concrete in the middle of an abstract formula is very disconcerting. This cannot be better illustrated than by reference to the abstract types of the periodic and loose sentences just supplied. If the reader remembers—and very probably the reader will remember, for in actual teaching the point has struck quite a number of pupils—the first sentence dealt with the first letters of the alphabet, and the second with the final letters of the alphabet. The pupil at once wants to know *why*. He is so accustomed to find a meaning in all the illustrations used, and to find a meaning underlying the general activities of life, that he very naturally looks for one here. He applies the principle: *The exception proves the rule*, and wants to know why the matter —for in this case the bare letters form the matter— should be different in the two cases.[1] Since the two kinds of sentences are regarded as differing merely in form, it is well to avoid even the trifling difference suggested by the letters. The same

[1] It is because of this that in changing from Murray's Dictionary to Webster's in Chapter I., I have taken the trouble to mention *why*. Had I not done so, I should certainly have been asked my reason by a number of readers.

letters should be used in the two cases. As a later exercise, on the other hand, the examples might be changed if only to show that the exact number of clauses and the nature of the subjects and predicates have nothing to do with whether a sentence is periodic or loose.

CHAPTER X

THE STORY AS ILLUSTRATION

When the worldly-wise Chesterfield gives the advice "Never tell stories," he has in view the social bore. He is pleading for the rights of the individual in conversation, which are always endangered when story-telling creeps in. The teller of tales is of necessity a monopolist.

In expository work, whether in school or on the platform, the speaker's monopoly is already granted, so any objection to story-telling must be based on other grounds. To the ordinary listener at an ordinary lesson or lecture even a comparatively dull story is more interesting than the rest of the talking, and need not, if the expositor has the necessary skill, interfere with the development of the main line of thought. As a matter of fact, teaching by means of stories is of the most venerable antiquity and is practically universal. Plato recognises its importance in education. In *The Republic*[1] we have the following:—

Socrates. Shall we just carelessly allow children to hear any casual tales which may be devised by casual persons, and to receive into their minds ideas for the most part the very

[1] Book ii. Section 377. The English is Jowett's.

opposite of those which we should wish them to have when they are grown up?

Adeimantus. We cannot.

Socrates. Then the first thing will be to establish a censorship of the writers of fiction, and let the censors receive any tale of fiction which is good, and reject the bad; and we will desire mothers and nurses to tell their children the authorised ones only. Let them fashion the mind with such tales, even more fondly than they mould the body with their hands; but most of those which are now in use must be discarded.

Plato then proceeds to give examples of the sort of things found in the current stories of his time, in which the gods are represented as doing unworthy things. Even Homer and Hesiod are not held free from blame, and would require a great deal of attention from the censor before Plato would let their works loose among young people. Most teachers have an uncomfortable feeling about specially prepared "books for the young," and it is with a little shiver that they approve of "the authorised ones." The specially prepared story is apt to suffer from the dissipated interest of the author. He has to keep his eye so closely fixed upon the censor that he is apt to forget the children.

We shall be in a better position to criticise the illustrative story when we have considered its mode of affecting readers or hearers. There are two main purposes to be served by the story as a means of instruction, the first limited to the communication and the acquirement of knowledge, the second extending to conduct. In the second class there are two divisions. For in using the story as a means of affecting conduct the teacher depends upon the pupil's inherent tendency to imitate, and according as this imitation is direct or mediated by some degree of reflection, we have two forms of

application, primary and secondary. There may thus be said to be in all three outstanding uses of the story.

The first use of stories is to give practice in manipulating ideas. Terms as presented to us in text-books are often inert, dead. But when we find them in use in a story they are living and functioning, and often explain their meaning by their very use in a context that is otherwise intelligible. We find them there as we find them in real life. In fact, story-reading is a kind of living at the second remove. It extends and enriches our experience. What is true about the historical novel in the teaching of history is true of the story in respect of life in general. It shows us principles in action. We know certain facts as facts by themselves, but in the story we find those facts applied in a life that is not—or at any rate ought not to be—very different from our own. We seldom realise how much we owe to stories in the way of education. To be sure, teachers are now rather keen on the subject of stories, but this modern interest is only the coming to consciousness of a principle that has been long applied. We are becoming conscious of and are writing about the educative influence of the old story-tellers, wandering minstrels, pedlars, and fireside Scheherazades; but their influence has been present all the while. The use of the story that we are at present considering is independent of the moral effect of any deliberate lesson the story may convey. The value lies in the material presented to the mind for exercise.

Consistency with the facts of ordinary life is surely a modest demand to make from the user of illustrative stories. The moral may be unimpeachable, and the rarer condition of truth to human

nature may be observed, but if a glaring breach of natural law is detected in a story, all the rest goes for nothing; harm is done, not good. The classical story of the magnanimous miner is a case in point. The vessel is slowly settling in mid-ocean. The miner, who is returning after having made his pile, has completed the arrangements necessary to meet the catastrophe. The confiding little girl, who of course has no relatives on board, comes up and in good Sunday School language says, "Oh sir, can you swim?" He admits that he can, so she at once places herself under his protection, and so touched is he with her implicit faith [see alphabetical index] that he at once, though of course reluctantly, removes his belt that contains his gold—worth half a million—and does what is right [see under *Duty* in the alphabetical index, for the story appears under this head as well]. As a rule the attention is so much taken up with the moral side of the question that no trouble arises. But if any one happens to take up the arithmetical challenge implied in the half a million, and works out the actual weight of this value of gold, the anecdote suffers serious moral damage. The amount of gold the poor fellow is represented as carrying in his belt weighs just a few pounds less than four tons. The pity is that the whole story goes to pieces on this fact, for £5000 would have served the illustrator's purpose just as well. The smaller sum would weigh about eighty-nine pounds, quite a sufficient handicap to prevent the miner trying to save both the girl and the belt.

The second and most obvious use of the story is to incite to a definite line of action. "Go thou and do likewise" is the natural ending to stories of this kind. It is clear that Plato has this

imitative use mainly in view. The doings of Uranus and Cronos are not to be told to the boy, lest in later years he should make a practical application of what he had learned, and

> even if he chastises his father when he does wrong, in whatever manner, he will only be following the example of the first and greatest among the gods.[1]

Plato is no believer in the awful example; he knows that the suggestive force of imitation works in one direction only. This class of story, then, should be as straightforward as possible. Parallelism should be avoided where direct teaching is available, and when used should be made as clear as possible, and as free from refinements. Such stories are illustrative of life, and should bear the test of constant comparison with things as they are. School stories are apt to fall lamentably short here. The classical sinner in this respect, if we are to believe the popular clamour among teachers, is *Eric, or Little by Little.* Priggishness is the universal complaint against books of this class, and it is perhaps impossible to avoid this vice when we set ourselves deliberately to prepare an illustrative story. But the priggishness in moral school stories is trifling compared with the unnaturalness introduced into the Sunday School story of commercial success. In business, if anywhere, it is easy to test recipes for success. A boy who is brought up on stories of the immediate commercial success that follows upon religious practice is apt to become unduly depressed when he enters on real life. In the book the young man is dismissed because he has lost an order by confessing that the beans were not of the same quality at the bottom of

[1] *Republic*, ii. 378.

the barrel. This is true to life. But the book[1] makes the employers write to the young man a few days later saying they had a position of great trust vacant, and would he accept it at 300 dollars increase on his former salary. This is not quite so close to the facts of business life. What could be more misleading than the following, a type of hundreds of illustrative stories :—

A few years ago, the owner of a large drug-store advertised for a boy. The next day the store was thronged with boys applying for the plaee. Among them was a queer-looking little fellow, aceompanied by his aunt. "Can't take him," said the gentleman ; "he's too small."

"I know he's small," said the aunt, "but he's prompt and faithful."

After some eonsultation, the boy was set to work. [Naturally employers would take the smallest of the throng, if only he had an aunt with him.] Not long after a eall was made on the boys for some one to stay in the store all night. The other boys seemed reluctant to offer their services. But this boy promptly said, "I'll stay, sir."

In the middle of the night the merehant went into the store to see that all was right, and found the boy busy at work eutting labels. "What are you doing, my boy?" said he. "I didn't tell you to work all night."

"I know you didn't, sir, but I thought I might as well be doing something."

The next day the eashier was told to "double that boy's wages, for he is prompt and industrious."

Not many weeks after this, a show of wild beasts was passing through the streets, and naturally enough all the hands in the store rushed out to see them. A thief saw his opportunity, and entered by the back door to steal something. But this prompt boy had stayed behind. He seized the thief, and after a short struggle eaptured him. [Do not forget how "little" and "small" he was a while ago—but then maybe it was a small thief.] Not only was a robbery prevented, but valuable artieles stolen from other stores were reeovered.

"Why did you stay behind," asked the merehant of this boy, "when all the others went out to see the show?"

"Beeause, sir, you told me never to leave the store when the others were absent ; so I thought I'd stay."

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[1] *Bible Models*, by Dr. Richard Newton, p. 57.

Orders were given once more: "Double that boy's wages, for he is not only prompt, and industrious, but faithful." [How soon one acquires the doubling habit!] That boy is now getting a salary of twenty-five hundred dollars a year, and before long he will become a member of the firm. [We are a little surprised at the delay in making him a partner.] He was following Elijah's model of promptness, and it helped to make his fortune.[1]

What a disillusionment is in store for boys brought up on such travesties of real life!

The third use of the story as illustration resembles the second, inasmuch as it conveys a direct lesson, but differs from it since it does not present a simple line of conduct to be imitated. It rather suggests general principles which must be applied by the pupil to his own case. Sometimes it is written to order as in the case of the fables and allegories, but sometimes it has been made for quite other purposes and has had a meaning read into it by some ingenious expositor. New applications of familiar old stories illustrate this use. A great many of our best political cartoons are based on this manipulation of old material in a new connection.[2] An ingenious commentator illustrated his whimsical view of what he called "The Devil's Apprenticeship," by showing the gradual improvement in temptation methods, as shown by three historical examples of Satan's workmanship. In the case of Job he knew so little about his business that he endeavoured to obtain his ends by blundering brutality and cruelty. When it came to the temptation of our Lord he had learnt enough to go about the matter in quite a different way; and had he had to deal with an ordinary case he would

[1] Dr. Richard Newton, *Bible Models*, p. 179.

[2] Witness the many ingenious applications of *Alice in Wonderland* to current political events.

probably have won, thanks to his more attractive methods. But when the turn of Faust came, Satan had learned his art of temptation so well that he was irresistible. He had learned not to bully and torture; he had given up even the attractive lure; he did not pester Faust one way or the other: *he waited till he was called.* Had the commentator known of the newer psychology he might have expressed his meaning by saying that Satan had attained the point of carrying on temptation by means of pseudo-auto-suggestion.

Nowhere can we find a better example of what Plato would call "authorised tales" than in the Fables of La Fontaine. These were, and to some extent still are, recognised as specially suitable for the instruction of the young. They held the place in France that the Catechism held in Scotland. Children were asked if they knew their fables, just as a teacher might ask a boy if he knew "his tables," or as Roger Ascham might have asked him if he knew "his noun." It was only, therefore, to be expected that Rousseau would have something very serious to say against them. His attack in the *Emile*[1] follows two different lines, the cognitive and the moral. The first part of his criticism deals with the matter of the fables mainly from the point of view of the children's intelligence. He is anxious to show in the first place that children cannot understand the fables. When he has demonstrated this to his satisfaction, he proceeds to show that even if they did understand, they would be sure to misapply their knowledge. The first part therefore deals with the expository side, the second more directly with the illustrative. As both are of the greatest interest in connection with our subject, the passage

[1] Edition de Ch. Lahure, 1856, Livre ii. p. 490 ff.

is worth quoting in its entirety. As the Rousseau criticism demands a line-for-line translation of the Fable of the Fox and the Crow, I have been driven, though not even on speaking terms with the Muses, to make a rendering of my own.

THE FOX AND THE CROW

On tree-top perched sat Master Crow:
Within his beak he held a cheese,
The scent led Master Fox below,
Who him addressed in words like these:
"Ha! good day, good day, dear Sir Crow;
How fair you are! How do your looks me please!
Without a lie, if but your note
Matches at all your beauteous coat,
You are the phœnix 'mongst the woodland train."

These words with joy nigh turned the Crow's weak brain,
And to display his dulcet strain
He opes his beak—down falls the cheese amain.
The Fox enjoyed the cheese, then said, "Good Sir,
Now learn that every flatterer
Lives upon him his flatt'ries please:
A lesson this, no doubt, well worth a cheese."
Confounded and ashamed, the Crow
Swore, somewhat late, none else should have him so.

Criticism by Rousseau

On tree-top perched sat Master Crow:

Master. What is the meaning of this word in itself? What does it mean before a proper name? What meaning has it here?

What is a crow?

What is the meaning of "on tree-top perched"? We do not say "on tree-top perched," but "perched on a tree-top." Consequently we must speak of poetical inversions. We must tell what prose is, and verse.

Within his beak he held a cheese,

What cheese? was it Swiss, Brie, or Dutch? If the child has never seen a crow, what do you gain by speaking to him of it? If he has seen one, how can he imagine it holding a cheese

in its beak? Let us always make our illustrations agree with nature.

The scent led Master Fox below,

Another *Master*. But this time by good right. He is passed Master in all the tricks of his trade. We must tell what a fox is, and distinguish his true nature from the conventional character which he has in fables.

Led by the scent of a cheese;

This cheese held by a crow perched upon a tree-top must have had a powerful smell to be perceived by the Fox in a thicket or in a burrow. Is it thus that you exercise your pupil in the spirit of well-balanced criticism, which only allows itself to be imposed upon under suitable artistic conditions, and can discriminate between truth and lying in the tales of another?

Who him addressed in words like these:

Words! Foxes speak, then? They speak the same language as Crows? Wise instructor, be careful. Weigh well your reply before making it; it means more than you think.

"*Ha! good day, good day, dear Sir Crow;*

Sir! a title which the child sees turned into ridicule, even before he knows that it is a title of honour. Those who say *Sir* Crow will have plenty to do before they explain this *Sir*.

How fair you are! How do your looks me please!

Padding, useless repetition. The child seeing the same thing repeated in different terms learns to speak slovenly. If you say that this redundancy is an art of the author, that it enters into the plan of the Fox, who wants to appear to multiply praises with words, that excuse will do for me, but not for my pupil.

Without a lie, if but your note

Without a lie! People lie, then, sometimes. What can the child think if you explain to him that the Fox only said "without a lie" because he was lying.

Matches at all your beauteous coat,

Matches! What does this word mean? Teach the child to compare things so different as voice and plumage; you will see how he will understand you.

You are the phœnix 'mongst the woodland train."

The phœnix! What is a phœnix? Here we are all at once thrown into the fictions of antiquity, almost into mythology.

The woodland train! What figurative speech! The flatterer ennobles his speech and gives it more dignity in order to render it more seductive. Will a child understand this delicate policy? Does he ever know, *can* he know what a noble or a low style is?

These words with joy nigh turned the Crow's weak brain,

One must have already experienced very keen passions to understand this proverbial expression.

And to display his dulcet strain

Do not forget that to understand this verse and all the fable the child must know what the dulcet strains of a crow are.

He opes his beak—down falls the cheese amain.

This line is admirable. The very harmony makes a picture of it. I see a big, ugly, open beak; I hear the cheese falling through the branches; but beauties like these are lost on children.

Opes.[1] This word is out of ordinary use. It must be explained. One must say that it is only used in verse. The child will ask why people speak differently in prose and in verse. What will you answer him?

The Fox enjoyed the cheese, then said, "Good Sir,

Here we have, then, already goodness turned into vileness. Certainly the tree of knowledge is an early plant in our children's garden.

Now learn that every flatterer

General statement; we are quite beyond our depth.

Lives upon him his flatt'ries please:

No child of ten will ever understand this line.

A lesson this, no doubt, well worth a cheese."

That is true and the thought is very good. Yet there will be found very few children who can compare a lesson to a cheese, and who would not prefer the cheese to the lesson. We must get them to understand, then, that this remark is only a joke. What fine-drawn distinctions for children!

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[1] In the original this note applies to the word *alléché* in the third line from the beginning, but the general sense is not at all changed by transferring the remarks to the English poetical form *opes*.

Confounded and ashamed, the Crow

Another pleonasm ; but this one is unpardonable.

Swore, somewhat late, none else should have him so.

Swore ! What sort of blockhead is the master who dares to explain to a child what an oath is ?

Here we have abundance of details, yet not so many as would be necessary to analyse all the ideas of this fable, and to reduce them to the simple and elementary ideas of which each of them is composed. But who believes that there is need of this analysis to make oneself understood by the young ? None of us is philosopher enough to put himself in the place of a child.

Now all this is ingenious, and very effectively put. Unfortunately, it does not stand the test of practical application. Rousseau has fallen into the very common mistake of underestimating the intelligence of a child. Further, he has made the mistake of specifying an age. Most of us would have thought his criticisms applied to a child of seven.[1] We find that he has in view a child of ten. One of the teacher's chief difficulties with children of this age is to keep them from generalising too freely. Not only do most children easily understand the generalisation "every flatterer lives upon him his flatteries please," but unfortunately many of them actually apply it. There is no difficulty whatever in getting a class of pupils of ten to understand this fable. As a matter of fact, the teacher of such a class will have to face a certain resentment among the pupils at having to deal with such childish matters. As to the special difficulties raised by Rousseau, they can be all easily overcome or postponed. It is not at all necessary, for example, that there should be an elaborate discussion of the nature of prose and verse. Children of ten

[1] In his criticism of the moral he speaks of "children of six."

know exceedingly well in a practical way what each is, and the time for a logical definition is not yet. Would any one maintain that such a definition is necessary before a child can understand fully the fable before him? The inversion that distresses Rousseau will certainly be noted by the pupil. He will feel that it is different from the rest of his book work, just as he notes that much of his book work is different from his spoken work. He is becoming practically acquainted with what inversion means; he is laying up a capital of experience of literary form against the day when he has to face the ordinary laws of rhetoric. The inquiry about the kind of cheese is puerile. The dilemma about seeing a crow is avoided by showing a picture—which by the way settles the relative size of the cheese at the same time. Rousseau and the naturalists may be left to fight it out about the fox's sense of smell. Grown-up people hear enough about the wonderful powers of animals in this way to be willing to accept La Fontaine at his face value, and children will certainly not suffer from following their example. As to the conventional character of the fox, there is not much that the child of ten brought up on ordinary school books does not know. The idea of a child learning to speak slovenly from imitating the style of La Fontaine! "People lie then, sometimes." The naïf Rousseau would have us believe that a child of ten is not aware of this. Even an English judge would not dare to claim such ignorance. "Matches" would give very little difficulty to a class of girls; and no class of boys of ten could be puzzled by the recondite statement, "If your singing is as fine as your coat is pretty." "Phœnix" must of course be explained, that is, we must tell the child what we have read in books about

it. In two minutes the child knows as much about it as most of us go through life with. "Can a child know what a noble and a low style is?" Certainly, if only Rousseau will allow him to have examples of the noble style. The other he usually has thrust upon him. Does anyone think that a child of ten cannot discriminate between the style of a comic song and that of one of Aytoun's Ballads or one of Macaulay's Lays. Naturally the child cannot write a thesis on the distinction. "Turned the crow's weak brain," seems to Rousseau a terrible strain on the children's intelligence. The trouble is that for this expression the pupils I have tested have usually had too many equivalents. Unfortunately they were rather of the "low style":— "got barmy with joy," "off his nut with joy," "so glad, he got a slate loose"; not elegant, but horribly expressive of full comprehension.

While on the score of intelligence Rousseau is over anxious, and certainly over critical, he has a strong case when he takes up the moral aspect.

> I ask if it is to children of six that we should teach that there are men who flatter and lie for their profit? One might at most teach them that there are mockers who make fun of little boys, and laugh in their sleeve at silly boyish vanity; but the cheese spoils everything: one teaches them not so much to drop the cheese from their own mouths as to make it drop from the mouth of another. Here then is my second paradox, and it is not the least important.
>
> Observe children learning their fables and you will see that when they are in a position to apply them they almost always do it in a way contrary to the intention of the author; and that instead of guarding themselves against the vice of which we wish to cure or from which we wish to protect them, they are inclined to love the vice by means of which one makes profit out of the failings of others. In the preceding fable children laugh at the crow, but they have all a warm side towards the fox; in the following fable you think you are giving them the grasshopper as an example—not at all, it is the ant that they will choose. One does not like to eat humble

pie ; they will always play the grand part ; it is the choice of self-love, a most natural choice. But what a ghastly lesson for children ! The most hateful of all monsters would be a hard and miserly child, knowing what was asked of him, yet refusing. The ant does more ; she teaches the child to chaff while refusing.

In all the fables where the lion is one of the characters, since he is the most distinguished, the child never fails to make himself the lion ; and when he superintends distribution, well taught by his model, he is most careful to seize everything. But when the gnat gets the better of the lion, that is another affair ; then the child is no longer the lion, he is the gnat. He learns to kill one day by needle-thrusts those whom he dare not attack in a stand-up fight.

In the fable of the lean wolf and the fat dog, in place of the lesson in moderation which is intended to be conveyed, he takes a lesson in licence. I shall never forget seeing a little girl weep copiously because she was being taught docility by means of this fable. Her friends could not understand the cause of her tears ; at length they learned. She felt galled like the dog ; she wept because she was not the wolf.

Thus, then, the moral of the first fable quoted is for the child a lesson in the basest flattery ; that of the second, a lesson in inhumanity ; that of the third, a lesson in injustice ; that of the fourth, a lesson in satire ; that of the fifth, a lesson in self-sufficiency.

But perhaps all this moral which serves me as an objection against fables may furnish so many reasons for preserving them. We must have one moral in words and another in actions in society, and these two do not at all resemble each other. The one is in the Catechism, where folks leave it ; the other is in the fables of La Fontaine.

Depressing as all this sounds, it is not without its bright side. The very self-reference that Rousseau deplores is in itself a force that can be utilised by the teacher. It has to be remembered that however this self-reference may be debased by the love of the limelight, it is in itself an essential part of our nature. From what we have seen already as to the nature of consciousness, we are compelled to regard everything from our own point of view. Whether we will or not, we must treat

subjects on the assumption that we are at the centre of the universe. Not conceit but necessity makes us treat ourselves as the centre of all things.

As for the desire for the best part in the drama of life, that also is natural, but must be regulated by the possibilities of the case. Experience must teach the child his true place in the play, and the least costly experience is that of the second remove, as supplied by stories. Knowing that the pupil will inevitably put himself among the *dramatis personae* of the story, and almost inevitably cast himself for the hero's part, the teacher knows how to arrange his material. To begin with, the knowledge of this self-referent tendency frees the teacher from the necessity for that blatant moralising that most of us dislike. This does not mean that the teacher is not to take direct means to affect the pupil, but merely that he need not expound his methods and aims. If he arranges his materials properly, the pupil will inevitably do the rest. The story must be so presented as to convey a clear lesson; the pupils must be left to draw the moral for themselves. In cases where there is a conflict of opinion, there is room for exposition and even exhortation. But when the story raises a clear issue, the pupils may well be left to settle the matter for themselves.

A very effective example of the sort of self-interpreting story is to be found in the anecdote laid before a mixed class of boys and girls in one of the slum schools of London. There was no comment made by the teacher at the time, and it would almost appear as if even the circumstances under which the story was told in school might be left to be inferred from the story itself.

Solomon did many other clever things besides finding out who was the true mother of the living child. When the Queen of Sheba came to see him she gave him a great many puzzling things to do, but he did them all, and was never once caught out. One of her most cunning puzzles was to bring to him a dozen children all dressed exactly alike with their hair just the same length and combed in the same way. Some of them were boys and some girls ; and the puzzle was for Solomon to say which were which. All he did was to order his servants to bring basins and make all the children wash their hands. When this was finished, he picked out those who had washed their hands only but not the wrists, and said these were the boys. And he was right.[1]

Unfortunately certain stories are so ill adapted for their purpose that the pupil is not only left in doubt, but actually impelled to draw a totally wrong moral. Take the following story intended to illustrate *living faith* :—

At the battle of Waterloo, Nathan Meyer Rothschild was in a shot-proof tent, with a swift horse saddled and bridled by his side. At sunset he peered over the battlefield, and saw our soldiers sweeping the French before them. "Hurrah!" he cried, "the house of Rothschild has won Waterloo": his house had lent the money for it. He sprang into the saddle, galloped all night, reached the shore at daybreak, bribed a fisherman to take him across the stormy sea, and by whipping and spurring reached London thirty-six hours before any one else. He used these hours in buying up all the stocks he could, and gained nearly two millions of pounds. Many on the battlefield besides him had perfect faith in the good news, but their faith was a thin, lazy thing, and did not rouse them to act at once. And so a faith that does not master and move you cannot make you rich in the goods of the soul. Real Christianity is a real living faith in a real living Saviour ; it is a whole faith in a whole Saviour.[2]

This story has clearly lost its way. It has strayed out of some American "How to Succeed"

[1] I need hardly say that while I admire the effectiveness of the illustration, my approval does not extend to the fabrication of Scripture stories.

[2] *Bible Object Lessons*, p. 71. James Nesbit & Co., London, 1891.

series, where it was comfortably at home. What has this shot-proof stockbroker to do with the real Christianity of the concluding sentence? What can the boy learn from this story but to despise the soldiers whose thin lazy faith did not rouse them to act at once, and make a dash for London to scramble for their share of those two millions of pounds. In a case like this a moral is needed, as no one would suspect the author's meaning without it. But a story that really illustrates does not require a formal moral at the end. On the other hand, it is not unnecessary to remark that there is nothing really disgraceful in using a moral. So strong is the objection some people have to this form of direct moral instruction, that they would almost have us believe that there is something morally wrong in definitely proclaiming moral truth. The expression or suppression of the moral is a matter of psychology not of ethics. There is no ethical objection to our urging people to be moral. The only objection that is valid is that we may be less able to gain our ends if we alienate the sympathy of our pupils by boring them with the moral which they can quite well draw for themselves. The moral may be insinuated with much less chance of opposition at the beginning or in the course of the story.[1] The end is the fatal place, probably because the interest has naturally run down just at this point. The formality and the inevitableness of the moral are also to be taken into account. It has all the unpleasantness of the bill that is presented after the feast is over.

[1] In section 50 of the *Vorschule der Aesthetik*, Jean Paul Richter says: "... so wie die Moral aus der Fabel leichter zu ziehen, als die Fabel aus der Moral. Ich würde daher (auch aus andern Gründen) die Moral vor die Fabel stellen." We have here in fact a special case of the problem of the *Zielangabe*.

The story as compared with the moral represents example as compared with precept. There is room for both in teaching. Each has its special function. Not only does the story have behind it all the influence that belongs to imitation, but it has all the special force that comes from acting on one's own initiative. If we hear a story, and ourselves make the necessary application to our own case, we feel that it is we who are teaching ourselves and not others who are teaching us. This is why people in high positions in ancient times appear to have accepted in the form of fables lessons that would have cost the head of any one who dared to present them in the form of precepts. A divine, writing in favour of the use of religious anecdotes, tells us:—

> Even though silenced, people are not readily convinced and influenced by mere argument . . . narrating an instance of the effects of evil conduct often tells more loudly than a lecture against it; because men more readily imagine fallacy in our logic, than falsehood in our narrative of incidents, especially when associated with the life of some noted individual.[1]

It is not a matter of logic at all but of psychology. We react differently to a lesson according as it is presented to us by another or presented by ourselves to ourselves. Further, the association "with the life of some noted individual" is a dramatic touch and has little enough to do with truth or morality. The story of Nathan Rothschild given above would lose a great deal of its dramatic point if it were told merely about "a certain financier." But, on the other hand, the use of such a well-known name leads to the very questionings that Mr. Macleod would have us believe are avoided by attaching our story to a definite person.

[1] Norman Islay Macleod, *Moral and Religious Anecdotes*, Preface.

Inquirers find that the Waterloo story is as false in fact as it is in teaching.[1]

The question is sometimes asked: what are the qualities of a good illustrative story? It is easily answered in a negative way, at least: the good illustrative story must possess all the qualities that make an ordinary story good. With advanced classes illustrative stories should be short and pointed—in the sense of having one point, not many. With young children it is wise to keep in view the general experience effect, even when the story is being used for moral ends. A certain lavishness is desirable in story-telling for the young. We are told that the fables of La Fontaine, charming as they are, still fall far short of rousing the enthusiasm that rewards the telling of tales by writers infinitely inferior to the French fabulist. The explanation offered is that the fables are too concise. No sooner has the child warmed up to his work than the tale has ended. It is not so much that the child objects to the moral—it is well known that young children are themselves somewhat severe moralists, and if left to themselves would supply much more drastic penalties than the ordinary fabulist would sanction—as that he has

[1] Rothschild was in London when Waterloo was fought. By means of a specially effective system of communication he received the news of the Sunday's battle by Monday night, and intimated it to Lord Liverpool on Tuesday morning. But as his Lordship had only a "thin lazy" faith, he did not credit the news. On Tuesday afternoon a second of Rothschild's couriers brought by another route confirmation of the news; but Lord Liverpool was still unconvinced; and as a matter of fact it was thirty hours after this second courier had been interviewed that the official despatches came from Wellington himself. Rothschild certainly operated on the stock exchange, but he was far from keeping his news a secret. Had Liverpool believed him at once, his Lordship might have had a share of the two millions. See an interesting article by Lucien Wolf in the *Saturday Westminster Gazette* for June 26, 1909.

hardly had time to lose himself in Fable-land before he is rudely reawakened to the realities of life. It is in this way that one can account for the tolerance of, and even the preference for, somewhat long and, to older people, rather dreary stories. The child enjoys the sustained atmosphere of other-worldliness, and at the same time gains practice in dealing deliberately with the elements that make up the world of thought, whether regarded from the point of view of imagination or of reality.

For this last reason it is particularly necessary that in the stage that succeeds the fairy tale the *illustrative* story should be in its details consistent with the facts of life. The pupil should be able to learn from the story in an indirect way a great many facts, and must not be misled by having impossibilities introduced into a story that is not honestly labelled "marvellous."

With older people, who can make the necessary allowances, liberties may be taken with literal truth, though artistic truth must be preserved. Wordsworth is not very happy in his proclamation at the beginning of *The Westmoreland Girl* :—

> Seek who will delight in fable,
> I shall tell you truth.

Everything depends on the kind of truth one has in view. Some clergymen will not use any story the literal truth of which they cannot vouch for. While this restriction seriously limits their resources, it has the great compensating advantage that it prevents them from making the caricatures of real life that pass muster with some of their colleagues. But from the point of view of teaching there is nothing against invented stories, except that they are usually very badly invented. Writers on the

theory of fiction are fond of telling us that really high-class fiction is truer to life than the things that happen every day. But while *The Strange Case of Dr. Jekyll and Mr. Hyde* may be in one sense more true to life than many of the incidents recorded in our morning paper, it is not so well suited for certain illustrative purposes as a more matter-of-fact narrative. For advanced pupils Stevenson's story forms an admirable illustration, since they can make abstraction of the supernatural elements, but in the case of young pupils the story is not suitable. The need for material accuracy in dealing with young children arises naturally from the fact that the story in their case has to serve the double function of illustrating some point of discourse and at the same time providing material and giving opportunity for the acquiring of new experience of things in general.

Children are notoriously fond of fairy tales, and yet they are also very exacting in their demand for truth in the stories told them. There is no real contradiction involved. Children naturally like to hear of wonderful things, and would at the same time like to believe that these wonderful things really happened. Long before school age the child keeps its fairy-tale world and its real world quite apart. And it is to real-world stories that the touch-stone of truth is so rigorously applied. Fortunately at early stages it is not difficult to get a sufficient number of incidents from the experience of the teacher and his immediate circle, supplemented by what is available in the way of printed biography, to meet the needs of the case; and at later stages the pupils acquire the power of detachment that enables them to see the truth in an incident that they are not sure ever did occur, but that might

well have occurred. It is better for the teacher not to emphasise the fact that any particular story is true, as the main effect of such insistence is to make the children recognise that all the other stories are not true.

It is difficult to say exactly what degree of real connection should be insisted on between the story and the lesson in which it occurs ; for the degree of ingenuity among teachers differs so much. One man may introduce almost any story to a class without danger of appearing to have dragged it in. Others are so clumsy that even an intrinsically suitable illustrative story has all the air of wondering how it came to find itself there at all. I have on my bookshelves several volumes of various sizes bearing some such title as *Moral and Religious Anecdotes.* Some of them are published plain. They contain stories and nothing else. They are religious Joe Millers, and that is all. Others take a higher flight and classify their contents, so that if you wish to illustrate Spiritual Pride, or Worldly Wisdom, or Backbiting, or Fault-finding, all you have to do is to turn up the alphabetical index under the proper letter, and then select your story from those supplied. This wooden method appeals to certain minds, but it generally results in pedantic dulness. The illustrations are technically right. They do illustrate the heads under which they are placed. The stories in themselves are usually at least moderately interesting ; but somehow they seem to lose their sparkle when they are passed through the alphabetical sieve. A story that has entered the mind of the teacher without prejudice, and is there worked up into an illustration, is worth many gems culled from an alphabetical index. An experienced trainer of Infant school teachers under

the London County Council urges young teachers never to use a story till they have "lived with it for three months."

The teacher's wisest course is to get his mind filled with the subject he is to teach, and then browse about among all manner of books, and mix with all manner of men. Illustrative incidents will occur in the most unexpected places. It must not be forgotten that the mind imposes itself upon all that it deals with. If the mind is full of well-organised masses of ideas in connection with a given subject, it cannot help fitting all the ideas that it accepts at all into the masses that dominate it at the time.

CHAPTER XI

ELABORATION

We have seen already[1] that there is an important distinction between having an idea and realising an idea. This realisation may be regarded from the point of view of intensity, or from that of complication. To realise the idea of *red*, we have to concentrate the consciousness in such a way as to reproduce as nearly as possible the state of consciousness that accompanies the actual sensation of red. But, on the other hand, we may realise the idea of *church* by allowing to come into the consciousness all the elements that go to form this idea. When Hobbes calls words "the counters of wise men," he means that we can use words as a sort of shorthand representation of concepts, and implies that we are entitled to use this shorthand, only on condition that we are able to transcribe it into longhand whenever we are called upon to do so. In ordinary speech we use words representing such complex ideas as church, money, bimetallism, without at the moment of using the words bringing into consciousness more than an infinitesimal part of what the words really imply. It is assumed, however, that if called upon we could set forth in

[1] See p. 71.

detail all the elements that make up the complex idea we are dealing with.

It is true that very often when we proceed to elaborate the full meaning of a particular idea, we find that it does not by any means contain all that we expected. We go through the world largely on the credit of a fullness of knowledge that is not there. One of the main purposes of the Socratic dialectic is to expose this ideational bankruptcy. Idea after idea is examined. The interlocutor is invited to elaborate it as far as he is able; and the result is nearly always that great gaps are exposed. When a pupil sits down to write an essay he is really entering upon an exercise in Elaboration. In fact, especially in the American schools, there is a recognised exercise under the name. The pupil is given a more or less pregnant sentence and is called upon to bring out all its implications. When Dr. Arnold invited his pupils to write on *The Difference between Advantages and Merits*, he really called upon them to allow their ideas on those subjects to develop themselves, and then to compare and contrast the results. For this development time must be allowed, so thinking at this level must be slow.

There is naturally a very great gain in being able to do our thinking on the Hobbes credit system. If we regard thinking as the adapting of means to ends on the ideational plane, it follows that if we can get at our ends without developing the content of each idea as it occurs, we effect a great saving. So long as we are working below the inference point there is obviously no need to get small change for our ideas. In matters that fall below our inference point the ideas are so welded together in causal relations that we cannot use them amiss

without rousing certain oppositions that at once come into consciousness, and raise the whole subject up to the inference point and therefore secure the necessary investigation. Obviously, if we had to allow each idea to elaborate itself every time we used it, thinking would become impossible. Even at the inference point we do not require to make a complete elaboration of the relevant ideas; all that is necessary is that we should arrange them so that their potentialities shall be awakened, and raised to the intensity necessary to keep them in the subconscious state. When this has been accomplished, all our mental content that is relevant to the subject under discussion is in an excited state, so that any attempt to make a combination inconsistent with existing combinations will be at once checked by the rising into consciousness of the relevant existing combination and the consequent opposition to the proposed combination.

It is not till we have reached the gaping point that it becomes necessary to allow every relevant idea to elaborate itself to its fullest extent, so as to bring into the arena all the elements that can by any possibility have anything to do with the problem. In this way we give the mind a chance of making the combination that will reduce the unorganised mass to order.

A special kind of elaboration is that which takes the form of turning every sort of idea that will admit of it into some species of picture. Many people are unable to carry on their thinking at all without the aid of some sort of pictorial representation. The mental processes of such people may be compared to the petty retail businesses conducted by small traders, all of whose financial transactions are carried on by means of coins of small denomina-

tions. This small-change type of thinking is regarded with great contempt by some of the professional philosophers. Dr. Hutchison Stirling, for example, is very bitter on the subject.

> Now it is this association of ideas that constitutes thought to most of us—a blind instinctive secution of a miscellaneous multitude of unverified individuals. These individuals are Vorstellungen, figurate conceptions—*Ideas*—crass, emblematic bodies of thoughts rather than thoughts themselves. Then the process itself, as a whole, is also namable Vorstellung in general. An example, perhaps, will illustrate this. "God might have thrown into space a single germ-cell from which all that we see now might have developed itself." . . . What is involved in this writing is not thought but Vorstellung. In the quotation indeed there are mainly three Vorstellungen—God, Space, and a Germ-cell. Now with these elements the writer of this particular sentence conceives himself to *think a beginning*. To take all back to God, Space, and a single Germ-cell, that is enough for him and his necessities of thought; that to him is to look at the thought *beginning* sufficiently closely. But all these three elements are already complete and self-dependent—God, one Vorstellung, finished, ready-made, complete by itself, takes up a Germ-cell, another Vorstellung, finished, ready-made, complete by itself, and drops it into Space, a third Vorstellung, finished, ready-made, complete by itself. This done—without transition, without explanation, the rest (by the way another Vorstellung) follows; and thus we have three elements with no beginning—at the same time that we have four with no transition—but the *fiat* of the writer. This then is not thought, but an idle misspending of the time with empty pictures.[1]

We need not take this diatribe too seriously. As to "thinking a beginning," Dr. Stirling is no doubt right. This demands the highest degree of abstraction. But there is a place for figurative thinking as well. A little further on in the Preface Dr. Stirling himself, reluctantly it is true, and within brackets, but still quite clearly, admits that there is another side: "(We shall see a side again where our abstractions are to be re-dipped in the

[1] Preface to the original edition of *The Secret of Hegel*, p. xl. (ed. 1898).

concrete, in order to be restored to truth; but the contradiction is only apparent)." Even the playing with pictures is far from being an idle misspending of time. At certain stages and in certain subjects pictorial thinking has a useful function. Why need the pictures be empty? Here is what a French philosopher has to say on the other side:—

> Picturing is not reasoning [*Image n'est pas raison*], people sometimes say. This is a great mistake. There is nothing more lucid, more enlightening [*explicatif*] than certain images. One is sure of having an idea that is truly intelligible when one is able actually to conceive it, that is to say, to bring it back to an intuition or a representation. To translate an abstract idea into images is to prove that it can be resolved into positive conceptions. This is to make it seen, touched, understood.[1]

Herbert Spencer clearly believes that all our thinking is figurative, as may be inferred from the following passage:—

> As we do not think in generals but in particulars—as, whenever any class of things is referred to, we represent it to ourselves by calling to mind individual examples of it. . . .[2]

It is certainly too strong to say that we never think in generals, but the possibility of thinking in generals in no way militates against the contention of Souriau and Spencer that we can and do think by means of images. Even in the case of those who deny that they have any power of forming mental imagery, it is probable that imagery of some sort is present. Speaking of the loss among scientific men of the power of visual representation, Mr. Francis Galton tells us:—

> The highest minds are probably those in which it is not lost, but subordinated, and is ready for use on suitable occasions. I am, however, bound to say that the missing

[1] Paul Souriau, *La Suggestion dans l'Art*, p. 233.
[2] *Essays*, stereotyped edition, 1868, vol. ii. p. 15.

faculty seems to be replaced so serviceably by other modes of conception, chiefly, I believe, connected with the incipient motor sense, not of the eyeballs only but of the muscles generally, that men who declare themselves entirely deficient in the power of seeing mental pictures can nevertheless give lifelike descriptions of what they have seen, and can otherwise express themselves as if they were gifted with a vivid visual imagination. They can also become painters of the rank of Royal Academicians.[1]

There may not, therefore, be the fundamental difference that Dr. Hutchison Stirling would have us believe between his thinking and that carried on by the ordinary person. For us the important point at present is that some kind of imagery is of the very essence of illustration. Many people after hearing a purely abstract statement of some argument are quite at a loss till they have translated it into a series of pictures. Accordingly the practical teacher is much more safe with an excess on the side of the concrete. But a caution is not perhaps out of place at this point. In the schoolroom so many caveats are entered against the abstract that among our younger teachers who have had some theoretical training there is a tendency to regard the abstract as something in itself to be avoided. Certainly we must begin with the concrete. There is very general agreement with the formula: From the concrete to the abstract. But, after all, this places the abstract in the honourable position of being the goal of our teaching. The trammels of the concrete must be thrown off so that our pupils may enter the freer medium of the abstract. Further, there must be no divorce between the two. The abstract must be always capable of being expressed in terms of the concrete.

[1] *Inquiries into Human Faculty and its Development*, Everyman's Library, p. 61.

There are occasions, of course, on which the introduction of the concrete only clogs the wheels of thought, but there are others in which the abstract thinker is saved from error by continual reference to the concrete.

The element of time has, of course, to be taken into account. We sometimes hear such phrases as "with the swiftness of thought," and some people appear to believe that thought takes no time at all. All thinking takes an appreciable time, but the kind that best deserves to be ranked as a standard of speed is the kind that does not hamper itself with images. To carry on a train of thought by means of imagery demands quite a considerable time. But the important question is whether this time is wasted or well spent.

The struggle between the abstract and the concrete becomes acute in discussions concerning the teaching of Arithmetic. Some teachers regard the abacus with suspicion, and look askance at all the infant-school paraphernalia of beans, and balls, and bricks. They are afraid that children will acquire the concrete habit, and will go through life on the bean level of calculation. In the case of "fingering" there is certainly a danger from the fatal convenience of this means of counting, but as a matter of fact the child soon tires of the limitations imposed by the beans, and seeks the freedom of abstraction as soon as he finds that he can calculate without them. In arithmetic we need never want to get beyond the concrete in applying its principles. Teachers are too apt to regard arithmetic as something important by itself; to take the view of the mathematical savant who rejoiced that a certain theorem he had promulgated could not be used for anything practical. The

truth of the matter is that arithmetic is only a particularly abstract way of regarding common things. The danger of excessive abstractness is nowhere better illustrated than in those sections of our arithmetic text-books that elaborate certain rules for dealing with particular classes of concrete matters. Stocks and shares are marked off from mere percentages, and weird headings such as *Alligation* are used to keep certain matters in their special corner. The same sort of thing began in algebra text-books, but has fortunately had rather a set-back of late. The requirements of examinations made it worth the specialist's while to classify the sort of problems set, and we were beginning to have "rules" for clock problems, hare-and-hound problems, bath problems, age problems. Fortunately teachers are realising that this is carrying abstraction too far. The rule must not be regarded as a means of saving all thought with regard to the matter to which it is to be applied. The place of the abstract is between the stating of the equation and its solution. It must begin with the concrete, and at the end it must square its results with the concrete. In the middle of the working of the problem we cannot say what relation $\frac{35y}{13}$ has to the hands of a clock, but so soon as the operator rises again to the "answer" we are once more in the region of the concrete, and our results must stand the test of comparison with the concrete.

It must not be forgotten that thinkers who are able to soar into the empyrean of the Hutchison Stirling abstractions have gained their power of flight by mastering the relevant concrete, and that the results of their high thinking must at least not contradict the concrete itself, though it need not

be consistent with the quasi-abstract views that the less free thinkers obtain by the help of Vorstellungen. The teacher very often occupies the position of the abstract thinker who has reached a certain conclusion that he can help his pupil to reach only by the aid of certain figurate conceptions. The development of Vorstellungen in the mind naturally takes time, but the time is not necessarily wasted. From the figures the mind of the pupil may rise to a complete understanding of the underlying principle and so secure his freedom. But while we are at the figurate stage it is necessary to go at an appropriate pace. We must hasten slowly, in order that we may get the full advantage of the stage at which our pupils stand. We must allow ideas to elaborate themselves so that the full content may be examined. Very often illustration consists of nothing else than giving complex ideas a chance to develop in consciousness in a natural way. Some pupils may be unable to understand an explanation that the majority of their class-mates have found to be perfectly clear. Before seeking out some new form of statement, it is often well to see what can be done by getting the pupils to allow the ideas represented by the words used in the explanation to develop themselves in their consciousness. When each of the ideas concerned is allowed to develop its implications, it results that certain relations become manifest that would otherwise have remained hidden.

Minds are found to differ greatly in their power to give ideas a chance to develop their implications. Too often what happens when an attempt is made to allow an idea to unfold its meaning is that at the second or third remove from the surface meaning the consciousness is switched

off into some other series of ideas connected by a more or less loose bond of association with the initial idea. What Professor Stout calls "psychic fringes"[1] have to be taken account of here. Each idea has its own fringe, and when several ideas are being developed at once there is a certain amount of interference caused by these fringes. Sometimes the struggle of the various fringes is so keen that further development is impossible, and some entirely new idea through a side association slips its way into the consciousness and drives out the ideas that have been trying to develop themselves. It is necessary, therefore, that the teacher should be ready with some help to the particular ideas he wishes to be allowed to develop. Sometimes, indeed, it comes about that the mere enumeration by the teacher of the elements of a compound conception may be helpful to a certain class of mind. Many of our best writers illustrate this need by the construction of their paragraphs. The first sentence enunciates the real substance of the paragraph, all the rest is an elaboration of the meaning contained in that first sentence. When Macaulay has said of Horace Walpole, "The conformation of his mind was such that whatever was little seemed to him great, and whatever was great seemed to him little," he has given us the whole substance of the paragraph that the sentence introduces. Yet when we turn to the elaboration of the idea as contained in the rest of the paragraph, we realise that we understand it in a much fuller sense than we did before we had read the whole paragraph.

> . . . Serious business was a trifle to him, and trifles were his serious business. To chat with blue stockings, to write

[1] *Analytical Psychology*, vol. i. p. 92 ff.

little copies of complimentary verses on little occasions, to superintend a private press, to preserve from natural decay the perishable topics of Ranelagh and White's, to record divorces and bets, Miss Chudleigh's absurdities and George Selwyn's good sayings, to decorate a grotesque house with pie-crust battlements, to procure rare engravings and antique chimney-boards, to match odd gauntlets, to lay out a maze of walks within five acres of ground, these were the grave employments of his long life. From these he turned to politics as to an amusement. After the labours of the print shop and the auction room, he unbent his mind in the House of Commons. And having indulged in the recreation of making laws and voting millions, he returned to more important pursuits, to researches after Queen Mary's comb, Wolsey's red hat, the pipe which Van Tromp smoked during his last sea-fight, and the spur which King William struck into the flank of Sorrel.

Obviously the specific cases in which Walpole exemplifies the weakness with which he is charged in the first sentence form legitimate illustrations of the theme. In such a case the expositor is assumed to have knowledge of certain facts that may not be in the possession of the pupil. Sometimes elaboration takes the form of merely setting forth in a vivid way certain aspects of the original statement. This presentation does not imply any special knowledge on the part of the illustrator. Any of his readers may do the same for themselves from the material supplied if only they have imagination enough. Sir A. Conan Doyle has an excellent passage[1] that exemplifies both these forms of elaboration. The narrator of the story wishes to convey an idea of what the Napoleonic wars really meant to England. He begins by a reference to his father:—

When he died we had been fighting with scarce a break, save only during two short years, for very nearly a quarter of a century. Think of it, you who live so quietly and peacefully now! Babies who were born in the war grew to be bearded

[1] *The Great Shadow*, p. 6.

men with babies of their own, and still the war continued. Those who had served and fought in their stalwart prime grew stiff and bent, and yet the ships and the armies were struggling. It was no wonder that folk eame at last to look upon it as the natural state, and thought how queer it must seem to be at peaee.

Down to this point the author is simply working out in a vivid way conceptions that any one with a keen appreciation of the situation could elaborate for himself from the data assumed. This is a form of elaboration that is of special value in the school-room. The rest of the paragraph proceeds on the ordinary line of elaboration that adds new matter while illustrating the main point:—

During that long time we fought the Dutch, we fought the Danes, we fought the Spanish, we fought the Turks, we fought the Amerieans, we fought the Monte-Videans, until it seemed that in this universal struggle no raee was too near of kin, or too far away, to be drawn into the quarrel. But most of all it was the Freneh whom we fought, and the man whom of all others we loathed and feared and admired was the great Captain who ruled them.

There is a still easier form of elaboration that confines itself to simple enumeration of elements that are implicit in the original conception, and could be supplied by the most ordinary listener or reader. No special keenness of observation, no gift of imagination is required. We have seen that suggestion acts instantaneously in recalling all there is to recall of a given whole. The poet makes his suggestion, appeals to his reader, and leaves the rest to him. That is, the ordinary poet does this. For there is an extraordinary class of poets who seek to save their readers time and trouble by enumerating in detail all the elements that are implicit in the ideas suggested in a poem. Walt Whitman is a notorious sinner in this way. He is

pre-eminently the poet of the catalogue. He wishes, for example, to emphasise the very common feeling that occasionally occurs to all of us of the variety of experiences that are going on at every moment of every day. Accordingly he selects the probable conditions and doings of all the sailors of the globe. He gives a long catalogue, that reads like a quotation from a gazetteer, of the places where sailors are likely to be found, and another of the sort of things they are likely to be doing. The nature of the list may be inferred from the concluding line :

Some with infectious diseases.

Lest it should be supposed that this description is exaggerated, it may be well to quote one of the poet's catalogues. This time he wishes us to realise the great variety of things that may be made out of wood, and helps our jaded imagination with the following inventory :—

The axe leaps !
The solid forest gives fluid utterances,
They tumble forth, they rise and form,
Hut, tent, landing, survey,
Flail, plough, pick, crowbar, spade,
Shingle, rail, prop, wainscot, jamb, lath, panel, gable,
Citadel, ceiling, saloon, academy, organ, exhibition-house, library,
Cornice, trellis, pilaster, balcony, window, turret, porch,
Hoe, rake, pitchfork, pencil, waggon, staff, saw, jack-plane, mallet, wedge, rounce,
Chair, tub, hoop, table, wicket, vane, sash, floor,
Workbox, chest, string'd instrument, boat, frame, and what-not.[1]

Contrast this crude catalogue with the following lines in which Tennyson apostrophises the vessel that is bringing home the remains of his friend :—

[1] "Song of the Broad-Axe," from *Leaves of Grass*.

I hear the noise about thy keel;
I hear the bell struck in the night:
I see the cabin-window bright;
I see the sailor at the wheel.

Thou bring'st the sailor to his wife,
And travell'd men from foreign lands;
And letters unto trembling hands;
And, thy dark freight, a vanish'd life.[1]

Here the reader gets real help from the elaboration. After reading the lines he has a better picture of the whole scene than he had before. The poet has selected the most effective elements in the night-scene. The "bell struck in the night" appeals to all, as is shown by the effect it produces when used on the stage, while the "cabin-window bright" is one of the most striking sights at sea, even though it did annoy Kipling's tramp captain.

It may be said that Whitman should not be compared with Tennyson but with Homer, whose catalogues of ships and states and heroes may appear to give some justification to the modern maker of poetical catalogues. There were, however, more than merely rhetorical reasons for the appearance of these lists in Homer's pages, though it must be admitted that they also served rhetorical ends, and served them well. It is interesting to note that the love of lists is characteristic of primitive writing, and that this same love is also apparent among young children. Almost every successful writer for little children uses the artifice of elaborating in this more or less arithmetical way all ideas that lend themselves to it. Passages like the following are common in books for the young:—

Perhaps you do not believe in fairies? Ah, well, I am sorry for you. I believe in them, in every one of them—gnomes and

[1] *In Memoriam*, x.

sylphs, and fays and sprites, and elves and goblins—yes, even in ouches—though some don't. There! What do you think of that?[1]

It is easy to see why young people should find a satisfaction in enumerating the content of a given idea. The elements have not yet had time to grow stale to the young mind. There is further the sense of power implied in the setting forth of the contents of the mental treasure-house. Nor must it be forgotten—and the consideration is not quite irrelevant to our present purpose—that the sense of rhythm involved in the enumeration of the elements is a source of keen satisfaction to the young, and is not without its attraction for the adult. The following example of illustrative enumeration from Dickens exemplifies at once the charm of rhythm, and the rhetorical value of this form of elaboration. The purpose is to throw discredit on the kind of training provided for elementary teachers in England. The method is to elaborate the mental content of what is assumed to be a typical elementary schoolmaster. The selected type is named M'Choakumchild, and this is how the elaboration is carried out:—

He and some one hundred and forty other schoolmasters had been lately turned at the same time, at the same factory, on the same principles, like so many pianoforte legs. He had been put through an immense variety of paces, and had answered volumes of head-breaking questions. Orthography, etymology, syntax and prosody, biography, astronomy, geography, and general cosmography, the sciences of compound proportion, algebra, land-surveying and levelling, vocal music and drawing from models were all at the ends of his ten chilled fingers. He had worked his stony way into Her Majesty's Most Honourable Privy Council's Schedule B, and had taken the bloom off the higher branches of mathematics and physical science, French, German, Latin, and Greek. He knew all about all the watersheds of all the world (whatever they are), and all the histories of all

[1] Rev. J. R. Howatt, *The Children's Pulpit*, p. 270.

the peoples, and all the names of all the rivers and mountains, and all the productions, manners and customs of all the countries, and all their boundaries and bearings on the two-and-thirty points of the compass. Ah! rather overdone, M'Choakumchild. If he had only learnt a little less, how infinitely better he might have taught much more.[1]

As rhetoric this is somewhat unfair, but very, very effective. Dickens was not an expert reporter for nothing, and a better example of deliberately inflated English it would be hard to find. It is notable that Logic does not appear among the subjects, so the assaulted M'Choakumchild is supposed to have been too busy with general cosmography to have had time to learn of an interesting little fallacy called the thaumatrope. At any rate Dickens goes on using his material over and over again as if his readers had never heard of Mr. Caudle's five-pound note. At the simple, yet in this case magical, word *grammar*, four of the most appalling words on the list collapse, while the commonplace word *geography* shrivels up nearly all that is left of the bubble. Yet it cannot be denied that grammar and geography do include the elements he enumerates, and so those subjects are made to appear by the mere process of elaboration, and the skilful repetition of the little word *all*, as something peculiarly pretentious and unnecessary. Dickens has here a clearly defined point of view, and it cannot be denied that he has admirably illustrated it.

This illustrative enumeration is not to be confounded with that form of illustration that consists in presenting a great series of different complex conceptions each of which has some element common to all the others. It is not a process of analysing out the common element in a number of cases and

[1] *Hard Times*, Bk. I. chap. ii.

so coming to an understanding of the principle to be illustrated. When we heap figure upon figure to get the cumulative effect of recognising the same element in many different environments, we enrich the conception by demonstrating how widely it may be applied. When Burns gives us his series of figures illustrating the transitory nature of pleasures—

> But pleasures are like poppies spread,
> You seize the flow'r, its bloom is shed ;
> Or like the snow falls in the river,
> A moment white—then melts for ever ;
> Or like the borealis race,
> That flit ere you can point their place ;
> Or like the rainbow's lovely form
> Evanishing amid the storm [1]—

we feel that the work of realising these fine figures is thrown upon us, and that the result is an intensified awareness of the fleetingness of human delights. This is produced by the fusion of the common element in the different cases. The concrete setting of each of the figures performs the same function, and these settings must therefore be regarded as falling under one category. Consequently they have to be treated as contrary ideas which arrest each other and thus leave the common elements free to coalesce.

In enumeration, on the other hand, the predominant force at work is that of complication, though this process must be regarded from two points of view according as we deal with the pupil's share in the work or the teacher's. Considered from the pupil's standpoint, elaboration consists in the breaking up of a complex into its elements. From the teacher's standpoint it consists in supplying a large number of elements that are implicit in the

[1] *Tam O'Shanter*, 59-66.

whole that is already a part of the pupil's mental content, though this whole is rather empty. When the teacher proceeds deliberately to enrich the content of a whole that he knows to exist in the mind of the pupil, it may be thought to be rather a matter of information than of illustration. Yet since the given whole is the starting-point, and the process results in making clearer the meaning of that whole, it may not unfairly be treated as a case of illustration.

Take the case of trying to enrich the pupil's conception of the state of affairs at any particular time in the history of the world. First of all he should be invited to bring out all the ideas he has on the given period. Here the pupil allows divergent association to work. The given date suggests all manner of diverse things that come into the mind one after the other. It is now the teacher's business to arrange the ideas thus called up, and to supply other ideas that not merely enrich the content of the complex idea of the period, but place the old elements in a new light. Often all that is necessary to understand two quite disparate ideas is the presentation of a third which inevitably leads to a correlation of the two first. We have here a suggestion of the illustrative power of the attendant circumstance. Frequently by presenting a matter in very great detail the teacher succeeds in illustrating it by giving so many starting-points for divergent association, that one or other of them must lead to such a collocation of ideas as shall throw light upon the pupil's difficulties.

Victor Hugo devotes a brilliant chapter[1] to the elaboration of the social and political conditions

[1] *Les Misérables*, Part I. Book III. chap. i.

of Paris in the year 1817. Here he takes it for granted that his readers know the details that he sets about arranging into an organised whole. He enumerates the well-known persons who flourished at that period, and indicates what each was doing. He suggests the prevailing fashions of speech, thought, and dress. He adds illuminating sidelights in the way of vivid contrasts between promise and performance, between real and apparent, between the trifling and the significant. The effect of the chapter is, that the reader feels that there was a living Paris in that year, and is ready to deal intelligently with any events that happened then. Still, unless one knows a good deal about the France of that time, one is not in a position to profit by the brilliant grouping of Hugo. His is a work of elaboration and enumeration rather than of knowledge-giving. This has to be kept in view in our teaching of history. There is a strange fallacy still somewhat prevalent about the text-books in this subject. It appears to be thought that the size of the text-book should vary in direct ratio to the size of the pupil: Big boy, big book; little boy, little book; whereas the sizes should be in inverse ratio. The beginner in history should have a great deal of detail; he is preparing the material that will afterwards be used when he is called upon to elaborate, group, and classify. Teachers are now so eager to get at the essentials of history, that they forget that the pupils must acquire a certain number of the facts of history. There is naturally no need to worry pupils with the old excess of dates and genealogical tables, but a great deal of wide general reading in history ought to precede the laudable attempts to teach constitutional and what may be described as scientific history.

Illustration by elaboration finds an important field in connection with definition in its wider sense. To give an idea of what Gothic architecture really is we must do more than tell our pupils that it is that form of architecture that prevailed between 1200 A.D. and 1475 A.D., and is marked by pointed arches, steep roofs, relatively large windows, and great height in proportion to the other dimensions. We must elaborate by calling attention to many different specimens of this kind of architecture, and by enumerating the different qualities of each so as to give content to the somewhat empty definition.

Few words are more difficult to define than *bourgeois*. The following attempt[1] takes the form of elaboration, and is therefore well suited to illustrate this section :—

> To call a person or an institution *bourgeois* is for her [Madame de Coulevain] the very worst degree of condemnation. "Foreigners," she writes, "often ask me the meaning of the the term *bourgeois*. I find it very difficult to define. . . . *Bourgeoisisme*, like provincialism, is a *mentalité*. . . . It communicates a shell-like impenetrability. Its characteristics are to be found in people who have received a superior culture, in whom are developed taste and a sense of beauty. It betrays itself by common ideas, extreme intolerance, blind obstinacy, an incapacity above all things to understand and to accord liberty. This *mentalité* creates a particular and unmistakable atmosphere. The peasant, the workman, the artisan, are not *bourgeois*. I might name a king who is more so than many people born in the Rue du Sentier. Napoleon I. was *bourgeois*, Napoleon III. was not. Balzac, Guy de Maupassant, were not *bourgeois*; Zola was. Two of our great newspapers, one of our best reviews, are. The Church of Saint Augustin is *bourgeois*, Saint Roch is not. The Comédie Francaise, the Opéra Comique, the Palais Royal, are *bourgeois*; the Vaudeville, the Variétés, the Théatre Antoine, the cafés concerts of Montmartre, are not. Among the tea-houses all are, with one exception. England, Italy, Spain, are not *bourgeois*; Germany is, and her emperor

[1] Winifred Stephens, *French Novelists of To-day*, 1908. Chapter on Pierre de Coulevain, p. 94.

is not." Until this last sentence (thanks to Madame de Coulevain's kind explanation) we had imagined ourselves beginning to understand the meaning of this enigmatical term ; but if the German Emperor be not *bourgeois*, then we are as far from understanding the word as ever we were.

As a matter of teaching, Madame de Coulevain makes a serious mistake in the sentence "Its characteristics are to be found in people who have received a superior culture," etc. No doubt the context shows that *Bourgeoisisme* is to be found elsewhere than among people who have received a superior culture. But the teacher has no right to depend entirely upon contexts, and the pupil is in this sentence warranted in demanding the caution of an "even" placed before the words "in people who have," etc. As illustration, Madame de Coulevain's effort has evidently failed so far as Miss Stephens is concerned. The cause of the trouble is the necessity under which Madame de Coulevain labours of being brilliant, antithetical, epigrammatic. It would have been quite possible for her to select less violent contrasts that would substantiate the distinctions implied in her general description of *Bourgeoisisme.*

Often elaboration may be very usefully employed along certain clearly defined lines. To get a clear idea of something it is frequently desirable to isolate certain groups of ideas. It is sometimes worth while to attend to only one set of things for a while to the exclusion of certain concomitants. For example, it might be useful to select from all the available biographies what certain men of a particular class of genius were engaged with at a certain fixed age, say twenty-five. It is a capital exercise to make a class discover what was occupying the attention of ten selected poets, or generals,

or statesmen, or men of science at this age. A particularly interesting exercise is to make the age coincide with that of the pupil, and put the exercise in the form: What were the following distinguished men occupied with and interested in at your own age? The difficulty is no doubt to get accurate and full details of the earlier years of important men. But great ingenuity is often shown by pupils in interpreting in terms of their own experience the scanty materials found in biographies. We have here, in fact, an excellent illustration of the process of elaboration guided by the subjective feeling of the pupil.

CHAPTER XII

DEGREE IN ILLUSTRATION

In a general way we must distinguish between the quantitative and the qualitative in Illustration. It may be possible to illustrate a certain fact or relation without having to go into quantitative details. There are some matters that we either understand or we do not understand. The meaning of such conceptions as size, cause, number, intensity, may be clearly conveyed and intelligibly illustrated in the course of ordinary exposition, without any undue strain on the part of the pupil. A general knowledge of any of these conceptions may be gathered from a comparatively small number of cases. No doubt in order to enrich the conceptions, it is necessary to multiply examples, but the nature of the conceptions does not change, however great the number of examples adduced. The idea of number as number, and of size as size, remains the same no matter what the nature of the phenomena may be in connection with which number and size are studied. But a pupil may be able to understand very clearly what size and number are, and yet may be unable to realise the meaning of certain sizes and numbers. It is one thing to understand the general meaning of a term, it is quite another

to appreciate intelligently the degrees that may be included within the scope of that term. The pupil may have quite a clear mastery of the meaning of number, and yet may have no real command over the concept of a million. In these days of millionaires and multimillionaires it may be a little easier to attach a definite meaning to the figures 1,000,000; and it is probable that Ruskin in the following passage underestimates the percentage of people who know the meaning of a million; but there is enough truth in it to make it worth our attention :—

> In our exceeding prudence we are, at this moment, refusing the purchase of, perhaps, the most interesting picture by Raphael in the world, and, certainly, one of the most beautiful works ever produced by the art-wisdom of man, for five-and-twenty thousand pounds, while we are debating whether we shall not pay three hundred millions to the Americans, as a fine for selling a small frigate to Captain Semmes. Let me reduce these sums from thousands of pounds to single pounds; you will then see the facts more clearly; (there is not one person in a million who knows what a "million" means; and that is one reason the nation is always ready to let its ministers spend a million or two in cannon, if they can show that they have saved twopence-halfpenny in tape). These are the facts, then, stating pounds for thousands of pounds; you are offered a Nativity, by Raphael, for five-and-twenty pounds, and cannot afford it; but it is thought you may be bullied into paying three hundred thousand pounds, for having sold a ship to Captain Semmes.[1]

This method of proportionate reduction is certainly useful in giving an idea of relative values, but it introduces complications of its own. A Raphael at twenty-five pounds is as incongruous as a fine of three hundred millions for selling a ship. Further, when the reduced total still amounts to the vast sum of three hundred thousand pounds, it is probable that all those who really understand

[1] *The Eagle's Nest*, Lecture II.

this quantity would also have an intelligent mastery of the concept three hundred millions.

But it has to be admitted that the expositor is faced by serious difficulties the moment he introduces the notion of degree. The pupil is found to be able to use his conceptions only within certain limits determined by his range of experience. When asked as a school exercise to write a letter to a companion telling how he spent a sixpence given by a generous uncle, a pupil from a poverty-struck home will often write intelligently and interestingly. But if the teacher makes the imaginary uncle prodigal enough to present half a sovereign, the result on the Composition of a class is disastrous. The pupils cannot rise to the expenditure of such a vast sum. A sixpence is a real thing to them, a coin that they have handled, a sum of money that they have already manipulated, though perhaps never with the entirely free hand permitted in an irresponsible letter. They may have seen a half-sovereign, and are certainly able to tell you at a moment's notice how many sixpences they could get in exchange for it. But to poor children the gold coin is something beyond the range of everyday operations. It represents capital rather than cash, and in consequence the letter usually takes the form of various recommendations for banking the troublesome money, or at any rate making some economic or philanthropic use of it. A common device among the young letter-writers is to describe the spending of one sixpence out of the whole, in ways that appeal to young desires, and to hand over the remaining nine and six to mother who is badly in need of it. A boy from a wealthy home, if asked at his expensive school to write a similar letter with half a sovereign as basis,

finds no difficulty, but a ten-pound note gives him pause. While the ratio between the sixpence and the half-sovereign is the same as that between the half-sovereign and the ten-pound note, it is found by experiment that the wealthy boy has less difficulty in passing from the half-sovereign to the ten pounds than has his poorer fellow in passing from sixpence to half a sovereign. Accustomed to copious supplies of pocket-money, the rich boy is less impressed by ten pounds than the poor boy by half a sovereign.

In relation to any class of phenomena we have all different thresholds of impressionability. What would astonish a rustic in London would make no impression on a seasoned dweller in that city; while the Londoner as paying guest at a farm finds himself impressed by many things that leave his hosts unmoved. In any department we must have stimuli of a certain degree of intensity before we are impressed; this intensity may be increased up to a certain point, but when this point is reached, we pass beyond the upward limit of impressionability.

For the benefit of Shadrach, Meshach, and Abednego, Nebuchadnezzar "spake, and commanded that they should heat the furnace one seven times more than it was wont to be heated."[1] This passage worried me when I was a boy. To me a furnace was a furnace, and once it had been properly kindled and was well supplied with fuel, it was as hot as it could be. I was unable to understand how it could be hotter, and further, even if it could, I was at a loss to see how that was going to benefit Nebuchadnezzar. As soon as his three victims were placed in the furnace they would be instantaneously burnt up. I could not conceive

[1] Daniel iii. 19.

of degrees of combustion. A man was either burnt up or he was not. My boyish point of view I find well illustrated in a remark made by Mr. H. G. Wells in speaking of the wonders of Niagara. He is not greatly impressed, and says: "A hundred tons of water is just as stunning as ten million. A hundred tons of water stuns one altogether, and what more do you want?"[1] I could not understand what more Nebuchadnezzar wanted. My religious instructor informed me that I need not worry about the number seven. The passage had no arithmetical signification, and merely meant that the furnace was heated very much more than usual. This was no doubt quite satisfactory from the religious standpoint, but it left something to be desired in other directions. As a matter of fact, it was not till I had come across certain figures regarding the temperatures in blast-furnaces that I realised that there might be good science as well as good religion in the story found in Daniel. It is true that the figures I encountered raised fresh difficulties. It was stated in the text-book that at the mouth of a certain blast-furnace the temperature was 320° C., and that it went on increasing with the depth till at a distance of 34 feet from the mouth the temperature was 1450° C. This enormous temperature was clearly far beyond my Threshold of Stun. Between zero and 100° C. I felt that I not only understood but realised the different degrees of heat. I had experienced the heat of boiling water, and ordinary childish curiosity had given me a fleeting experience of the presumably higher temperature of red-hot iron. I was quite convinced that after the boiling point of water I had no clear notion of what increase

[1] *The Future in America*, p. 72.

in temperature meant. It accordingly conveyed little to my mind when I was told that the heat at the bottom of a blast-furnace is so great that it must be measured by a number fourteen and a half times as great as that which measures the heat of boiling water. Still, as experience brought me more and more examples of very high temperatures used in actual processes, I began to have a working knowledge of what these temperatures may mean. The fusing points of the different metals naturally supply figures that have a practical value. When the pupil is told that pure silver fuses at 960° C., pure gold at 1075° C., and pure platinum at 1775° C., he begins to attach a meaning to those high temperatures. If now he examines the table of fusion points of Prinsep's Alloys (the silver and gold series, and the gold and platinum series), he gets a still clearer view of the meaning of relativity of temperature. To realise in any degree the still higher temperature of the oxyhydrogen flame (estimated by Bunsen at 2844° C.) and the electric arc (3000° C. to 3900° C.) the pupil must familiarise himself with certain processes with which these are connected.

In all this practical application in order to acquire an intelligent acquaintance with matters entirely beyond our Threshold of Stun, it will be found that there is a natural tendency always present to interpret unrealisable quantities in terms of realisable. For example, when the pupil is told the various temperatures of the different parts of the Bunsen flame—outer flame 1350° C., violet 1250° C., blue 1200° C., central dark cone from 250° to 650° C., he finds that he has a sort of impression that the inner dark cone is com-

paratively cool. The very introduction of this term *cool* is an indication of a reference to a subjective instead of to an objective standard. This mixing of standards is to be avoided, except in cases in which we are working below the Threshold of Stun. The moment we have risen above that threshold, we must do our comparisons in terms of units that may have been originally fixed in relation to something within our subjective experience, but which, once we have passed the threshold, can no longer be tested by reference to that experience.

Without making any pretence of severe scientific accuracy in this matter of stun, we may help our thinking by using some of our terms in a clearly defined way. Let that degree of intensity of stimulus that just rouses our attention to a particular fact or phenomenon mark the Threshold of Impressionability to that class of facts or phenomena. All the range between this and the point at which we are stunned may well be spoken of as the Zone of Impressionability. Above the Threshold of Stun, of course, is the region where nothing matters, so far as direct experience goes.

In dealing with the rich and the poor boy we were practically working all the time within the Zone of Impressionability. Neither of the boys was really stunned. Each of them found himself faced by a certain difficulty in dealing with quantities beyond his usual scale, but neither was brought up against unintelligibility, as would have been the case had they been called upon to deal with millions in a practical way. In the case of temperatures we find that there is a small range within which heat can be estimated by sensation,

but above and below this range there are long sweeps of gradations of temperature that may be understood and intelligently applied, but that cannot be interpreted in terms of sensation. In estimating the climate of a country or the heat of a bath, a writer may depend upon his readers making subjective references and he knows within what limits he can depend upon not exceeding their Threshold of Stun. But in all temperatures above and below the points at which the human organism ceases to record gradation, there is no meaning in referring to sensations in estimating heat. There is no need that we should have a physical realisation of 200° C., not to mention 2400° C.

In a crude physical sense we may treat the range within which the bodily organism records gradations of temperature as the Zone of Impressionability to heat. But our mental impressionability to ideas of the gradations of heat is a quite different matter. Our physical Threshold of Stun is reached long before our mental. Even on the physical basis the Threshold of Stun may be slightly raised. The exact number of tons of water that would stun Mr. Wells at Niagara, might not be enough to stun him at a later stage if he took to living close by a waterfall that carried just the requisite number of tons to stun him at the present moment. By and by it would be necessary to increase the number of tons if the stunning was to be kept up. But this raising of the threshold could not be carried very far. A point is soon reached beyond which the stun is insurmountable, and indeed this higher degree of stimulus would probably lead to the permanent injury of the organs stimulated.

On the mental side, however, there is nothing to hinder the gradual but steady raising of the Threshold of Stun with regard to any of the departments of the activity of the mind. It may be said that an important part of a teacher's work consists in the raising of the Threshold of Stun, a little on the sensational plane and a great deal on the intellectual. It is his business to use the senses and the ideas so as to provide a basis on which the pupil may continue to build in such a way that his Threshold of Stun shall continue rising in those matters that are important to him. There is no reason for this raising process to cease till physical decay intervenes.

In the matter of large numbers and vast distances, teachers are fully alive to the need for finding means to enable the pupil to realise quantities that are at first quite beyond him. The usual plan adopted is to institute some sort of comparison between small and great. In particular, the attempt is made to get rid of the unintelligibility of vast numbers by expressing the results of some process of manipulating them. The following is a typical attempt to get people to realise the enormous distances dealt with in Astronomy :—

> Let us suppose a railway to have been built between the earth and the fixed star Alpha Centauri. By a consideration of this railway's workings we can get some idea of the enormous distance that intervenes between Centaurus and us. Suppose that I should decide to take a trip on this new aerial line to the fixed star. I ask the ticket agent what the fare is, and he answers :
>
> "The fare is very low, sir. It is only a cent each hundred miles."
>
> "And what, at that rate, will the through ticket one way cost ?" I ask.
>
> "It will cost just $3,750,000,000," he answers.

I pay for my ticket and board the train. We set off at a tremendous rate.

"How fast," I ask the brakeman, "are you going?"

"Sixty miles an hour, sir," says he, "and it's a through train. There are no stops."

"We'll soon be there, then, shan't we?" I resume.

"We'll make good time, sir," says the brakeman.

"And when shall we arrive?"

"In just 48,663,000 years."—*Philadelphia Bulletin.*[1]

The enormous fare is certainly very impressive, but it is doubtful whether much is gained by representing the distance in terms of money, since in any case the numbers are clearly beyond the Threshold of Stun. No pupil can really appreciate the meaning of close on four thousand million dollars, and if he is to be impressed by the mere number of digits, it would be more effective to tell him plainly that Alpha Centauri is 37,500,000,000,000 miles away. As a matter of experience, I found that many people to whom this illustration was presented at once proceeded to reduce the dollars to cents, and then to multiply the result by one hundred in order to get at the exact number of miles. It may be felt that at any rate the forty-eight million years will help the pupil to realise the enormous distance. But the time is so great that there is an opportunity for the mind to conceive of the journey as being a rather restful experience. Instead of being impressed by the enormous space passed over, the mind is inclined to rest upon the evenness of the journey. So far as the illustration appeals to the pictorial, it defeats the ends of the illustrator, for the hurry and bustle of the train disappear when we project it against the silence of limitless space.

[1] Quoted by Mitchill and Carpenter, *Exposition in Class-Room Practice*, p. 231. The numbers given are inconsistent: they do not lead to the same result in distance.

It is interesting to compare a parallel illustration of the same distance as found in Sir Robert Ball, who is a master in such matters. He begins by bluntly stating the distance, which he says may be expressed in miles by a two followed by thirteen ciphers. Knowing that the expression 20,000,000,000,000 (which by the way does not correspond to the *Bulletin's* figures—but fortunately we are not here responsible for the facts that we have to illustrate) is quite beyond the comprehension of his readers, he sets about an explanation [1] that is an admirable illustration of the process of Elaboration. Like the *Bulletin*, Sir Robert arranges for a special tariff; in his case a penny per hundred miles. Then taking the British National Debt, which at that time (April 1887) amounted to £736,000,000, he seeks to make his readers realise this vast sum by first of all pointing out that the mere interest at a low rate amounts to £60,000 per day. Then he imagines the youngster filling his pockets with gold so as to go and buy a ticket. Pockets failing, a cart has to be called in; ten carts, fifty carts, a hundred carts. Finally the young traveller starts at the head of his procession of five thousand carts of gold, only to find that so far from getting any change back, he is still more than £100,000,000 short of the specially reduced fare.

Approaching the matter anew from a different point, Sir Robert gives some figures regarding the number of miles of cotton yarn produced in a Lancashire mill, then in all the Lancashire mills. Finally he works up to the statement that 400 years would be necessary for enough cotton to be grown in America and spun in England before there would

[1] *Starland*, p. 317. The book is a popular exposition intended for young readers.

be enough thread to reach to the nearest fixed star. But the highest point is reached when he says that "all the spinning that has ever yet been done in the world has not produced a long enough thread" to reach from the earth to the nearest fixed star. This spinning illustration I find causes too many questions to be asked as to details. Are the American mills included, or must all the spinning be done in England?—and so forth. Illustrations should not challenge such queries.

Sir Robert's illustration from the fact that in certain of the fixed stars, in spite of the enormous velocity of light, it would be possible at the present moment to see the Battle of Waterloo going on, is damaged by the pathetic condition "if they had good enough telescopes." Strangely enough, this *if* is a much greater stumbling-block to pupils than that in the other illustration, that if a telegraphic message had been sent off at the time to announce the birth of our Lord, it would be still on its way to some of the remoter fixed stars. In all this we are quite beyond the Threshold of Stun, and the materials of our illustration are tested more from the terrestrial than the celestial point of view. Somehow my students almost unanimously confess to be much more impressed by the telegram illustration than by all the others, though several have said that they enjoyed lingering over the possibilities of what could be seen from appropriate stars. Here we have the illustration becoming the substantive matter of thought.

The change from the railway unit to the telegraphic certainly increases the general impression of enormous distances. If we go on multiplying examples, we do gradually get a notion of the relativity involved. But the only way in which we can

realise vast quantities is by manipulating them, and utilising the conception of relativity so as to reach certain practical conclusions respecting the matter actually involved. When the astronomer tells us that Sirius is 1,375,000 times farther away from us than the sun is, we take the gentleman's word for it; but we do not realise what he means. It is true that some of us would accept the arithmetical challenge implied in his statement and work out the equation

$$93{,}000{,}000 \times 1{,}375{,}000 = 127{,}875{,}000{,}000{,}000\ ;$$

and some of us might derive satisfaction from being able to say that Sirius is one hundred and twenty-seven billion, eight hundred and seventy-five hundred thousand million miles from the earth; but are we any further forward as to what it all means? The answer is to be found in the fact that we can manipulate these figures in an intelligent way. We can make calculations and come to certain conclusions based on them, conclusions, be it observed, that a plain man can come to on his own account when the matter is properly presented to him. The following is taken from a school text-book which was formerly very widely used, and in which only a small section is set apart for purely astronomical matters :—

> It has been calculated that if the sun were removed to the distance of Sirius it would shine with only $\frac{1}{150}$ part of its lustre, and it has been conjectured, therefore, that the diameter of Sirius must be at least twelve times greater than that of the sun. Of this, however, we cannot be certain, for spectrum analysis has taught us, among other things, that stars shine with different degrees of brightness, owing probably to differences of temperature, and that Sirius is among the hottest and brightest of all.[1]

We have here a calculation—not a very safe one, as the writer warns us, but quite an intelligible

[1] William Lawson, *Outlines of Physiography*, p. 249.

one—based upon the enormous distance that we admit we cannot realise. The calculation is none the less valid. Further, when we begin to compare one fixed star with another, and to arrange the stars into their various magnitudes, we gradually begin to attach a more or less definite meaning to the enormous astronomical numbers; we can behave intelligently towards them. So with the minute subdivisions implied in the atomic theory, and the newer theories that appear to demand an even minuter subdivision. Chemists can act intelligently upon certain calculations based on units that they cannot realise.

The following illustration was burned into my mind at a very early period. It occurs in the Geography text-book[1] on which I was brought up :—

> The distance from Liverpool to New York is about 3500 miles, and can be traversed in about ten days. At this rate the time required to go from the Sun to the planets would be as follows :—
>
> | | | |
> |---|---|---|
> | 289 | years to | Mercury. |
> | 540 | ,, | Venus. |
> | 744 | ,, | Earth. |
> | 1,127 | ,, | Mars. |
> | 1,720 | ,, | the nearer Asteroids. |
> | 2,372 | ,, | the more distant Asteroids. |
> | 3,867 | ,, | Jupiter. |
> | 7,092 | ,, | Saturn. |
> | 14,262 | ,, | Uranus. |
> | 22,521 | ,, | Neptune. |
> | 156,500,000 | ,, | nearest fixed star. |
>
> At this rate it would have taken from 1000 years before the creation of man till now, in order to reach even Saturn.

This old illustration is not introduced for its own sake, but because of the effect it produced on certain students to whom it was presented. Their

[1] *Modern Geography for the Use of Schools*, by Robert Anderson.

attitude was at once that of the superior person. They did not quote Molière, but they led me clearly to understand that we had now changed all that, and that, thanks to the *Mauretania* and her rivals, we could now cut down these distances by exactly one-half. So difficult is it to keep the relative and the absolute in their proper places. To be sure, the young men immediately saw their error, and one of them justified himself to some extent by saying that, after all, America *is* really nearer to Europe than it was last century; and to gainsay him was not the part of one who teaches that the true meaning of an idea is the power to behave intelligently in relation to the content of the outer world involved in that idea.

Two summers ago at Niagara I read one of those folder advertisements of which the Americans usually make such effective use. Its purpose was to enhance the wonders of the falls. The length, breadth, thickness, and weight of the body of water were given, and after the mind had been sufficiently harrowed, the climax was reached by a statement of the length of time that it took for a cubic mile of water to fall over. I do not remember the exact figures of the folder, but have a vivid recollection of the sense of anti-climax involved. On calculating out the whole matter, I find the effect even more flattening than my memory led me to expect. Taking the figures supplied in the Ninth Edition of the *Encyclopædia Britannica* (these are old enough not to allow for any diversion of water for the power stations, and thus give the falls a fair chance to show up well), I find that 18,000,000 cubic feet of water fall over every minute. This is sufficiently impressive, but when worked out on a volumetric basis, the best we can say for the falls

is that they toss over an entire cubic mile in five days sixteen hours.[1] The impressiveness gained by using the magnificent unit of one cubic mile is not nearly sufficient to counterbalance the enormous loss in actual digits.

Few people are able to realise what a cubic mile means. In fact, the calculation we have just made has enabled us to understand better what is implied in the higher unit, and so far is of use. But the question we are at present considering is the illustrative value of the cubic mile unit, not the possibility of realising that unit. In point of fact, we have here reversed the parts played by the illustration and the illustrandum. The effect of the present paragraph has been to illustrate the enormous bulk of a cubic mile by means of the Falls of Niagara. If it takes even these gigantic falls five days sixteen hours to hurl over one cubic mile of water, then we may have some idea of what this unit implies.

[1] A little personal experience is perhaps in order here ; at any rate, it is instructive. In a lecture before the College of Preceptors in London in May 1909, I used this illustration, but I made a miscalculation to the extent of misplacing a decimal point. Though my result was thus ten times less than it should have been, it seemed big enough to correspond to what I remembered from the folder, so my suspicions were not aroused. In the correct verbatim report in the *Educational Times* for June 1st appears the passage : "The best we can do is to say that in thirteen and a half hours a whole cubic mile of water tumbles over the cliffs." No one wrote to correct this serious blunder ; but I am not now surprised that the usually vigilant arithmetician forgot his customary lust for accuracy. Not that the statement remained unchallenged. Without troubling to work out details, an acquaintance—an astronomer of all men—said there must be something wrong, as it certainly could not take so long as thirteen and a half hours for a cubic mile of water to tumble over the cliffs ; he had seen the falls and he knew. It was because of his objection that I revised my calculation, and now I find it very hard to get anybody to believe my result—so universal is the inability to realise what a cubic mile really means.

To obtain a pictorial conception of a cubic mile is not only difficult, but is of doubtful utility. In climbing an Alp we may be fortunate enough to come across a precipice that is just about a mile deep, and has certain relations with neighbouring landmarks that enable us to separate out approximately a cubic mile of air-filled space. The effect is almost always disappointing. The mile seems much smaller than we had expected, for the obvious reason that under the conditions sketched the surroundings are on such a grand scale that the imaged mile is dwarfed by its environment. Some prefer to get their conception through the medium of water. By noting certain distances on shore, and by fixing certain marks at sea, they get a square mile marked out, and then proceed to overwork their imagination in an attempt to figure out the cube of water of which the marked square mile is the upper face. The important point, however, is not to make a picture of a cubic mile, but to realise by practical application what it actually means.

Many illustrations that involve the Threshold of Stun aim at the pictorial when they should really seek to eliminate it. The pupil is told that there are approximately sixteen hundred million human beings at present living upon the earth. It is difficult to realise this vast number, so the illustrator sets about making a picture. He selects some particular part of the world that will just hold all the inhabitants of the earth standing packed together. The best situation is obviously an island, because the imagination will have the aid of the sea in limiting its operations. It is well that the island selected should have some hill from the top of which the whole island can be envisaged.

The Isle of Wight fulfils this condition almost perfectly. Standing on Ashey Down the spectator can command the whole island with a very trifling exception. The illustrator now proceeds with his calculations. The island covers about 147 square miles, and each square mile contains 27,878,400 square feet. Accordingly, the island includes 4,098,124,800 square feet. This divided by 1,600,000,000 gives almost exactly 2·5 square feet per human being, or a square of about 19 in. side—just standing room. Having now gathered the whole human race on the Isle of Wight, what better off are we? So far from being helped, the imagination is harassed. It has to work overtime, there are so many things for it to do with this huge crowd. The scene calls up too many irrelevant elements; we falter in our attempts to realise the different sizes, colours, and odours of those people swept in from all ends of the earth. How are they to be fed? Are we to picture them as arranged by nations or indiscriminately? How could they stand on some of the steep places in the island? I have seen many a class reduced to desperation by the surging questions raised by this preposterous picture. As a preliminary to a word-picture of the Day of Judgment the scheme may have its advantages, but for giving an idea of the population of the world it is not very successful. In actual practice it conveys the general impression that there are not so many people in the world after all. The Isle of Wight is such a little place. If the purpose is to show how much room there is still in the world, the illustration has its advantages, though it could hardly be used as a fair argument.

The best appeal is always to the highest unit available in the experience of the persons concerned.

Taking the biggest city with which the pupil has personal acquaintance, this could be compared quantitatively with the number of people in the pupil's native country, and then with the world population. The United States has a population that is rapidly approaching the good-natured number 100,000,000, so the American boy will soon have the advantage of a ready-made standard that renders comparison very easy. It does not follow that the American boy realises what the population of his Republic means. Still, all that is necessary for intelligent comparison is present.

We need a standard unit for our illustrative work, but it is not always necessary to reduce our quantitative illustrations to this standard unit. It is enough if we have a unit to which we can reduce them all if that be necessary. We ought to have a clear idea of what one square foot means, an acre, and, if possible, a square mile. In certain towns the municipal authorities are good enough to lay out somewhere in their parks a square acre, so that the children of the town may grow up accustomed to this as a standard. The Bank of England in London, we are told, covers exactly one acre of ground, but this is not nearly so useful a standard as the square acre. The bigger the quantities we are to deal with, naturally the bigger the standard unit. With certain astronomical measurements the unit is the radius of the earth, with others the diameter of the moon's orbit, with still others the major axis of the earth's orbit. Whatever the standard, it must be a definite one. The ordinary householder is so perplexed at the unintelligible order to put *one fluid ounce* of pepsin in a quart of milk, that he welcomes the practicable if inexact equivalent of *two tablespoonfuls*. But in

deliberate illustration some sort of standard should be insisted on, and should not be changed in the process of exposition or illustration. In working with money values, for example, we may have occasion to deal in several different coinages; but it is always better to keep to one as the standard during any one series of calculations. Dollars are easily valued in pounds sterling as we go along, without any great inaccuracy; but there is a great deal of time wasted and a certain danger of confusion incurred by continually passing from the one to the other. Some tourists on the Continent of Europe make life a burden to their friends by dividing by eight and multiplying by five at every kilometre stone. In a kilometre country we should accept the 1000-metre standard. After tramping for a day or two, "32 kilometres" is as clear a conception as is "20 miles" at home. Of course where actual contrast between the two standards is the immediate purpose, there must be continual interpretation of one in terms of the other. But in most cases there is no need for a double standard, and usually one or other is marked out as naturally more suited for the particular bit of exposition in hand—dollars in the United States, kilometres in France, inches in a popular description, centimetres in a scientific analysis.

CHAPTER XIII

MATERIAL ILLUSTRATIONS

When we try to classify illustrations we encounter certain difficulties. The first broad distinction that suggests itself among the various kinds of illustration is that between the real and the verbal. There seems a very important difference between mere words on the one hand, and such aids as objects, models, and drawings on the other. But while the distinction has a certain convenience, it must be remembered that both real and verbal illustrations make their appeal primarily to the same set of forces; the only way they can get at the mind is by rousing ideas. But an idea may be called up by a word as well as by an actual object, so that the two kinds of illustrations are practically one on the psychological side. There is the more need to insist upon this because of a very general impression among teachers and others that there is an inherent superiority in things as compared with mere words as a means of illustration. But here as elsewhere "each thing in its place is best." It has to be remembered that verbal illustration has certain advantages. It is much freer than illustration by means of actual objects; it gives much more scope for the action of the mind appealed to, since in any case only the content already acquired can be used.

The clergyman who produces an actual lily in the pulpit to illustrate his sermon on purity thinks he has used a stronger illustration than if he had merely referred to the flower. All that has happened is that he has aroused a certain amount of extrinsic interest that he must be exceedingly careful to turn into intrinsic interest in his subject before he can hope to profit by it as an illustration. The children can take out of the lily only what they were able to put into it before it appeared in the pulpit. Anything the clergyman can tell them about the lily as a plant will no doubt increase the knowledge of some of the children. But this is the result of information rather than of illustration. If the clergyman were dealing with Botany, the relation between the lily and his subject would be different.

We must clearly distinguish at this stage between an object as a subject of study and as an illustration. When we are giving instruction on some actual object, say in Chemistry, Botany, or Geology, nothing can make up for the absence of that object. People are now agreed that in practical subjects we must depend upon practical work.[1] Nothing can make up for the lack of laboratory and field work. Text-book teaching of practical subjects is now universally condemned. But this does not at all imply that a test-tube is inherently a better illustration than a metaphor. In the mind of the teacher there is too often a sort of descending scale of merit in which possible illustrations are arranged somewhat in this way :

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[1] Yet we find Sir William Ramsay saying : "Far too much stress is laid, nowadays, on what is called 'practical work.' It is possible to have quite an intelligent idea of chemistry without ever having handled a test-tube or touched a balance." Quoted by Dr. F. H. Hayward, *The Meaning of Education*, p. 15.

(1) The real object, for which anything else is a more or less inefficient substitute.

(2) A model of the real object.

(3) A picture of the object.

(4) A diagram dealing with some of the aspects of the object.

(5) A mere verbal description of the object.

Assuming that the teacher's purpose is to give information on the object, the above order of merit may to a large extent be justified. But it should not be forgotten that under these circumstances we are dealing with information and not with illustration. Too frequently the above general order of merit is carried over to the purely illustrative field, and we have an unwarrantable glorification of "objects."

Even with regard to what is properly called instruction on a given real object, there are certain respects in which a model or a picture may be actually of more service than the thing itself. It has to be admitted that it is not always possible to present to the pupils the real thing. In all cases this is to be regretted. It is a pity that such things as Magna Charta, an elephant, a locomotive, the Port of Bordeaux, cannot be brought to school. The teacher has reluctantly to do without them, unless he is able to take his class where these things may be seen. With this desire for the real we must all sympathise. But it is worth while noting that there are certain stages in instruction when a model is not only as good as but better than the object it represents. In other words, the model actually illustrates the real object. Sometimes the object is too large to be taken in at one sweep of the eye, and is therefore difficult to deal with. A large and complicated machine—take for example a

certain paper-making machine that as a matter of fact covers an area of over two thousand square feet —may be far better understood from a small working model than from the machine itself. So with extremely small objects, it is sometimes very desirable to have a magnified model for illustrative purposes.

It is obvious that in using a model abstraction must be made; the model must lose some of the qualities that belong to the real object. Sometimes the abstraction is confined to size. The model resembles the original in every respect except that it is either larger or smaller. A model locomotive may be an exact reproduction of one in actual operation on a railway. On the other hand, it may be slightly changed in certain details and yet convey the general impression of being the same as the real locomotive; and the internal variations may increase in amount, each new variation marking a higher degree of abstraction. For example, the model may have exactly the same machinery as the original, but the heat may be produced by burning methylated spirits instead of coal; and there are obviously all the degrees of increasing abstraction till we reach the child's toy that preserves the outward show, but is worked within by a spring. A model at any of these grades of abstractness may have its use as illustration; everything depending on the nature of the illustrandum. For the student of engineering the model must be so accurate that he can make from it measurements to scale. On the other hand, in teaching mechanics, a clockwork locomotive is quite good enough to illustrate certain problems of gradients.

In the case of students studying "in the field" the structure of a district of country, say the Lake District in the north-west of England, it is found to

be very difficult for them to have a grasp of the whole situation. They can see now this part and now that, but they cannot from any one point envisage the whole. Accordingly, they are set to make a relief map of the district in clay or plasticine. This is really a model of a high degree of abstractness. To begin with, it must be so accurately worked that our calculations may be based on it, allowance being made for the difference between the horizontal and the vertical scale. But the only real points of resemblance between the model and the district are in the proportions of the dimensions. The material used is of no consequence. Of course, in a more elaborate scheme the different strata might be represented by layers of different coloured clay contorted so as to represent the actual formations. Sometimes indeed very elaborate models of this kind are made in glass, so that the pupil may, from the side of the case, observe the various dips of the strata, and note the faults. But even here the material is not significant of the illustrandum.

In the case of a model to represent that bridge over the Rhine that has given so much trouble to every teacher who has piloted a class through Caesar's *Commentaries*, it would appear to be possible to make the model correspond to the original in all the respects with which we are acquainted. While such a model, made exactly to fit the conditions laid down in Caesar's text,[1] may be an excellent illustration of that text, it does not follow that it is a good illustration for the use of a party of men proposing to make a bridge over the Rhine, and that not because Engineering has advanced since Caesar's time, but because the whole problem of the strength of materials has to be recast according to

[1] Book iv. chap. 17.

the actual dimensions of the real bridge. Stresses and strains do not have the same effect upon the same material under different conditions of dimension. This is why practical men in general, and engineers in particular, use models for certain parts of their work, but prefer to test their results on the true scale before they are willing to apply them.

In the case of class work our principle should be the same as the engineer finds useful in his actual operations: begin with the real object, and end with the real object, but between the two use the model as freely as you like. In school we very commonly use models that involve a high degree of abstraction. In the teaching of Botany, we may have a greatly enlarged model of the primrose made of *papier mâché*. The form may be a perfect reproduction of that of the real flower; the colour a somewhat less accurate reproduction. But there the resemblance stops. Abstraction is made of size, flexibility, moisture, texture, scent. The sole value of the model is that its size enables the teacher to give a demonstration to the whole class. To facilitate this the model is made up of separate parts which can be separated from each other so that the teacher can make a formal dissection of the model, which dissection may be afterwards imitated by the members of the class while dealing with the real specimens with which they are then provided. For wherever possible the teacher should follow the example of the engineer, and end all his model work by a reference to the actual object. The pupils should begin with an examination of a real primrose actually growing in the garden or in a pot; then comes the demonstration on the magnified model, and finally the examination by each pupil of the cut specimen supplied.

The same sort of models are used in the teaching of biology. The cockchafer is selected as the typical insect, and there is a highly complex dissectible model constructed for class demonstrations. But a still higher degree of abstraction is reached in a series of hollow models of some forty animals produced by a well-known maker of school apparatus. One can understand the use of models in illustrating the outward appearance of such creatures as the elephant, the camel, and the bear; but when it comes to the horse, the cow, and the dog, it may be naturally asked wherein consists the usefulness of a set of models of creatures that may be conveniently seen in real life. One obvious answer is that the models indicate the relative sizes of the different animals; for in the series referred to the creatures are all made to a common scale. In the next place, the models are available in school, and enable the pupils to make certain observations that may be tested by a later examination of the actual animals as found in the open air. The objection that the models are mere shells of animals is hardly of much consequence. The child sees as much of the inside of the model cow as he sees of the inside of the cow in the field. Further, such models rouse an interest in familiar animals that the animals themselves cannot command. Just as the cows in a landscape in a drawing-room attract much more attention than they ever did in the meadow, so the models in school interest the children more than do the real animals—always taking it for granted that we are dealing with animals that have exhausted the charms of novelty. A *papier mâché* camel has little chance of surpassing the attractions of the live one. But in the case of the horse it is different. Most of us will look with interest at a model of

something that we pay no attention to when we meet it in real life. Advertisers have not been slow to profit by this interest in models, as is seen by the many tiny samples sent out, in which the characteristic bottle or packet that contains the commodity is exactly reproduced, but on a very reduced scale. The same interest is appealed to when the advertiser sends out a cart bearing a mammoth representation of the bottle or packet.

It goes without saying that the special value of the model lies in the fact that it gives us all three dimensions. It is therefore assumed that it is necessarily a better form of illustration than anything in the way of a drawing, which after all can never get beyond two dimensions, with a suggestion of the third. The model may be viewed from many different standpoints, and against different backgrounds. It is sometimes said that a model of the reconstructed Parthenon at Athens conveys a much more accurate conception of what it was once like than can any mere plan and elevation sketches. But for certain purposes a picture is a better illustration than a model. For example, a picture of the Parthenon painted by a sympathetic artist, with the model to keep him right in detail, and his own trained imagination to interpret in terms of colour the old surroundings, will probably convey a better impression of what was the real state of things in old Athens than does the mere dead model. This is perhaps a characteristic of the model, that it confines itself to the bare primary details. The artist's lay figure does all that is expected of it when it keeps him straight with regard to the three dimensions. Within these limits it does its work admirably; but it carries with it no suggestion of reality.

There is always something unreal in a complicated model that is not necessarily present in a picture. Take, for example, those elaborate models of various cities and ports that have been exhibited at certain of the great Exhibitions in different parts of the world. (A permanent collection of this kind is to be seen in the upper regions of the Louvre in Paris.) The observer has thrust upon him an inevitable feeling of triviality. The models have all the appearance of toys. They are excellent to work from. They give us a general view of the city and its approaches such as we could not get from any available point of view in the district. We can in a few minutes by means of compasses and scales get any desired measurements. But we cannot get rid of the feeling of unreality and childishness. So in dealing with the accurate models of great buildings of which the Germans are so fond. These models are excellent in demonstrating shapes and measurements, but they are useless in reproducing the aesthetic effect of the actual buildings. We can extract no enthusiasm from a model of St. Peter's at Rome. The abstraction of size has destroyed its power to impress us. Models of the Gothic cathedrals have a stronger aesthetic effect upon us than have models of the severer buildings of the classical times. When the old temples have lost the grandeur that their spaciousness gave them they have nothing left. The Gothic cathedrals too lose their grandeur, but in its place there comes a certain prettiness. Awe is a sentiment that cannot be represented on a reduced scale. Models can reproduce proportions but not sentiments. They have all the defects of the diagram as well as its merits. They are indeed nothing more than three-dimensioned diagrams.

It is because we live in a three-dimensioned world that the model deserves a place among our illustrative apparatus. Our daily experience makes it impossible for us to overlook the third dimension; but over-familiarity with two-dimensioned illustrations is very apt to lead to an unintelligent way of regarding certain matters. The globe, for example, is necessary to counteract the impression produced by the "World in Hemispheres" as it is presented to us at the beginning of our atlases. It is true that the globe in its turn is subject to abuse. In his usual aggravating way Rousseau makes us uncomfortable by calling it nothing but a plaster ball. But the teacher does not want it to be anything else. So long as he uses it as an illustration, he is proclaiming that it stands for something that it is not. Its merit is in its shape, not in its material. This shape prevents the illustrator from taking certain liberties that he allows himself when he has got rid of the third dimension. He wants, for example, to show that the British Isles occupy the enviable position of being in the very centre of the land hemisphere. Accordingly he does violence to all the known systems of map projection and combines the two hemispheres into a heart-shaped whole. The British Isles appear in their true projection on the middle line that marks the junction of the two halves of the heart, while all the rest of the world wriggles about in greater or less degrees of distortion. The proper way to illustrate the fact of the central position of the British Isles is to take up a globe and turn it so that the pupil is looking at it in such a way that he sees the greatest total amount of land that it is possible for him to include in one view. Once the model-world is placed in

this position, the pupil is invited to look for the British Isles. As a matter of fact, he will find them not far from the centre of the part of the world at that moment visible on the globe.

It is in connection with the seasons and the rotation of the earth that the use of a tangible ball is of importance as an illustration. No doubt in teaching such matters as longitude and latitude it is necessary to have a properly constructed globe with all the conventional signs properly filled in. The practical teacher is very often tempted to regard this orthodox globe with its axis fixed at the proper angle of $23\frac{1}{2}$ degrees as itself the illustrandum. He talks about "teaching the globes," whereas what he wants to say is that he teaches certain relations by means of the globe. When the earth's relation to the sun and to the other planets is to be illustrated, it is better to have a less formal ball to deal with. In practice it is found that a ball of worsted with a knitting needle thrust through the middle to represent the axis is about as useful a form of globe as can be found. Each pupil should be supplied with such a ball, and should be called upon to manipulate it as the teacher describes certain of the phenomena of the earth's rotation and revolution. At the testing stage it is well that only one pupil at a time should manipulate a ball, as, if the class works collectively, there will be little else than imitation in the case of a great many of the boys.

A very interesting comparison of the relative values of the two-dimensioned and the three-dimensioned illustration may be had from comparing the results of teaching from a diagram and teaching from the use of the ball. The familiar diagram of the sun at one of the foci of an ellipse, with the

earth in the four positions on the circumference corresponding to the four seasons, may be fully understood by the class. That is, the pupils may be able to say honestly that they understand the diagram and are able to answer questions on it. Now arrange for an experiment. On a table on an open space on the floor, place a candle or anything else that will represent the sun, and then call out one of the pupils and ask him to carry his ball of worsted round the supposed sun, in such a way as to represent the revolution of the earth, and thus demonstrate the cause of the seasons. In a large percentage of cases in which this experiment has been made, the pupil moved round the sun keeping the axis jealously fixed at what he believed to be $23\frac{1}{2}$ degrees from the vertical, but pointing at the sun all the time. This occurs even when stress has been laid by the teacher on the fact that the earth's axis is always "parallel to itself." The fixed angle of $23\frac{1}{2}$ degrees satisfies the mind's requirement in this respect, and nothing short of the confrontation implied in the permanent winter of the side remote from the sun in the actual experiment will rouse the pupil to the necessary dissatisfaction with his view as gathered from the plane diagram.

An orrery supplies a striking example of ineffectiveness in illustration. The motions of the planets and their satellites can be reproduced in a very accurate way, but the mental effect of the whole is discouraging. The distance effect is as much lacking here as in the case of models of huge buildings. Sir John Herschel speaks very strongly of the futility of giving an idea of the sizes and distances of the planets by this means, and sets forth a scheme of his own to convey the desired information.

Choose any well-levelled field or bowling-green. On it place a globe two feet in diameter; this will represent the sun; Mercury will be represented by a grain of mustard seed, on the circumference of a circle 164 feet in diameter for its orbit; Venus a pea, on a circle 284 feet in diameter; the Earth also a pea, on a circle of 430 feet; Mars a rather large pin's head, on a circle of 654 feet; Juno, Ceres, Vesta, and Pallas grains of sand in orbits of from 1000 to 1200 feet; Jupiter a moderate-sized orange, in a circle nearly half a mile across; Saturn a small orange, on a circle of four-fifths of a mile. Uranus a full-sized cherry, or small plum, upon the circumference of a circle more than a mile and a half; and Neptune a good-sized plum on a circle about two miles and a half in diameter. As to getting correct notions on this subject by drawing circles on paper, or, still worse, from those very childish toys called orreries, it is out of the question.[1]

This illustration fails in many directions. To begin with, there is a lack of a definite standard of size. What is the standard size of a pea, a cherry, a plum, an orange? Who is to determine how big a large pin's head is? Further, whatever the real size of a pea, the effect that the illustration produces on the mind of the ordinary reader is that Venus is larger than it really is in proportion to the earth. If it is said that all that is wanted is to convey a general impression, the answer is that the illustration invites comparisons, and suggests by its discrimination among the various qualifying adjectives that the comparisons are accurate. Again, the distances should be kept to the same standard; they ought all to be expressed in feet. These criticisms are not the outcome of arm-chair reflection. They express the complaints of many classes of students (ages ranging from eighteen to twenty-one) who have been offered instruction through this illustration.

The truth is that what are called real illustrations, those that deal with actual objects, have the defects

[1] *Outlines of Astronomy* (1849), p. 323.

of their quality and fail because of the very virtue on which real illustration prides itself—reality. Three-dimensioned illustrations sadly hamper the freedom of the pupil's imagination. If we are to picture certain grains of sand in a preposterous bowling-green two and a half miles wide, we find that so far from being helped by our illustration we are really hindered in our efforts to figure out the sizes and distances of the planets. Herschel's illustration certainly aids us in respect of the concept of distance, and gets rid of the toy effect of the orrery; but in so far as it substitutes peas and cherries for the spheres of the orrery it introduces limiting elements. After all, a diagram leaves the mind freer than do these concrete comparisons.

Sir John Herschel's illustration has been largely used by teachers, and it is interesting to note the changes they have made. It is generally used in schools in tabular form rather than as a description. Venus is represented by "a pea," but the earth by "a larger pea"—so strong is the teacher's love of accuracy and the pupils' of fairplay. The only other important change is that many teachers prefer to cut down the distances by one-half, taking the radius in preference to the diameter.

Another debatable use of the solid as illustration is to be found in the glyptic formulae of Hofmann. Not content with the elaborate patterns of the graphic formulae that were used to represent such complicated chemical combinations as dicobaltic tetrammon-hexammonic hexachloride (called *purpureo-cobalt chloride* for short), Hofmann launched out into the third dimension, and invented a system of spheres of about the size of billiard balls, each having one or more little tubes projecting from its

surface according as it was intended to represent a monad, a dyad, or an atom of some higher valency. By means of connecting rods of various curvature Hofmann was able to build up symmetrical combinations to indicate how the elements united with each other and formed more or less permanent wholes.[1] It is doubtful whether anything was gained by all this elaboration, for the models did not even pretend to reproduce a state of affairs that actually existed. If Sir John Herschel fails in making us realise the solar system, it is because we cannot properly represent what actually exists. In the case of the chemical formulae the teacher has to warn his pupils against imagining that what he sees in the model represents what actually takes place in chemical process. Dr. Edward Frankland of the Royal College of Chemistry, London, himself an excellent teacher, made extensive use of both glyptic and graphic formulae. He tells us in the preface to his well-known compendium :[2]

> I am aware that graphic and glyptic formulae may be objected to on the ground that students, even when specially warned against such an interpretation, will be liable to regard them as representations of the actual physical position of the atoms of compounds. In practice I have not found this evil to arise ; and even if it did occasionally occur, I should deprecate it less than ignorance of all notions of atomic constitution.[3]

But surely the concluding sentence is somewhat strong. Are we shut up to the alternative of glyptic formulae or "ignorance of all notions of atomic constitution"? The fact is that there are

[1] Later the tetrahedral form was introduced, as it has obvious advantages in indicating the common elements in combined molecules.

[2] *Lecture Notes for Chemical Students*, 1866.

[3] Yet it was with regard to one of the plates of graphic formulae in Dr. Frankland's book that the Oxford don remarked : "Ah, I suppose that is how the gases look under the microscope."

types of mind that find the glyptic formulae repellent, and others that revel in them with such delight as to lead to danger of confounding the illustration with the illustrandum. The other day a student of the second type brought forward a scheme for making "a model of the mind" on glyptic principles. Each idea was to be represented by a ball, and the apperception masses were to be built up separately and then combined with each other by uniting the different masses by means of common elements. Reflection for a few minutes shows how unworkable the scheme is, and yet it has great possibilities in the way of illustration. One of its main advantages would be that it would convince the students that an atomic theory of ideas is only an illustration of a system that cannot be fully explained on this basis.

When material illustrations are used in connection with solid geometry they have to fulfil the very function that Dr. Frankland warned his students against. They must be "representations of the actual physical position" of the elements of the illustrandum. There can be no question of the value of cardboard models in illustrating the exasperating little diagrams that adorn the eleventh book of Euclid, even though the severe mathematician looks askance at any attempt to represent the realities of which he makes abstraction. In projection, sections, development, and penetration the use of standard models is of the greatest value. Often all that is wanted is a glance at the actual model. It is different with some of the elaborate apparatus devised to make dull students understand the projection of points and lines on the two co-ordinate planes. After taking many classes through a course in Descriptive Geometry, and using with

them all manner of apparatus, I am convinced that in teaching the elements of the subject all the elaborate arrangements of beads and threads and pins are worse than useless. If the candidate cannot understand the dots and lines above and below the line of intersection in a given diagram,' he is not at all likely to understand the aggravating complications introduced by way of illustration. This is one of the cases in which the illustrandum is clearer than the illustration. An arrangement in cardboard or wood by which the two co-ordinate planes can be represented as cutting each other, and thus showing the four dihedral angles and the line of intersection (almost universally named XY), is a simple piece of apparatus that should always be available. It is usually made so that the two co-ordinate planes may be made to rotate on XY so as to (practically) coincide, and thus illustrate the relation of the various dihedral angles to the plane of the paper on which the pupil's drawing is to be made. Such a bit of apparatus is extremely simple, and leaves the pupil's imagination quite free with regard to individual problems while rigidly restricting it as to the conditions of all problems.

Generally speaking, there is a tendency in all material illustrations to become too elaborate, and the teacher is apt to think that their value is in proportion to the amount of time he spends in their preparation. In actual teaching their value is often in inverse ratio. It is different in the case in which the pupils themselves take a part in preparing the apparatus. When this occurs they acquire that familiarity with the subject that in the other case is confined to the teacher.

The ideal use of teaching-models is to have them made by the pupils, not merely as teaching illustra-

tions but as a substantive part of their intellectual work. It is not a case of making things, but of thinking thoughts and of expressing them in a material form. My colleague, Dr. T. Percy Nunn, has contrived to get several classes of quite young pupils to make drawings and models embodying their own observations of the sun and the moon, with the result that he has obtained astonishing results in the way of clear thinking on matters that greatly puzzle most adults. Boys of twelve starting from the daily measurement of the sun's shadow at noon have *themselves* worked out all the calculations necessary to develop the curve of the sun's apparent path through the heavens, and ended by making a cardboard model of this path in such a way as to make clear the relation between the apparent path of the sun and the real path of the earth. These boys talk on such matters now with an ease that disconcerts the ordinary educated man who has always to pause and reflect before he ventures to make any statement that correlates the real with the apparent in the movements of the heavenly bodies. Dr. Nunn himself writes, "I always regard my models as being devices to aid the boy in 'colligating' his own observations. They differ from the usual models in not aiming at dispensing with first-hand observations. That is, I think, why they are effective. The boy thinks of the *facts* by the aid of the symbols."

CHAPTER XIV

THE PICTURE AS ILLUSTRATION

From one point of view a picture is necessarily more abstract than a model. One aspect of reality is seized upon and elaborated. Even in the case of the mere reproduction of reality in a photograph there is abstraction. We are limited to one point of view and to the corresponding background. The model may be viewed from many standpoints, and from each standpoint there is a different background. All the laws of linear perspective enrich the possibilities of models as illustrations. When we consider aerial perspective and the laws of colour, we find still further need for abstraction forced upon the picture as a means of illustration. The painter must select the particular set of colours that mark the moment chosen for the painting. The fact that the colours of an object or a scene change from hour to hour, almost from moment to moment, has always been known, but has of late years been more clearly recognised. The school of Impressionist painters have done valuable work in bringing home to us this important fact. They claim that it is the artist's business to paint light as represented by colour. They ought to be called Chromatists rather than Impressionists. One

cannot look at Claude Monet's series of hayricks or cathedrals without realising that one picture can represent only one out of many aspects of the same object in respect of colour, just as it can represent only one aspect with regard to linear perspective. This painter's methods in his careful studies of light and colour have been thus described:

> He is said to take with him in a carriage at sunrise some twenty canvases which he changes from hour to hour, taking them up again the next day. He notes, for example, from nine to ten o'clock the most subtle effects of sunlight upon a hayrick; at ten o'clock he passes on to another canvas and recommences the study until eleven o'clock. Thus he follows step by step the modifications of the atmosphere until nightfall, and finishes simultaneously the whole series. He has painted a haystack in a field twenty times over, and the twenty haystacks are all different. He exhibits them together, and one can follow, led by the magic of his brush, the history of light playing upon one and the same object.[1]

When we examine these early morning hayricks, late morning hayricks, noontide hayricks, afternoon hayricks, and evening hayricks, we find that each has its individuality, and yet there is only one "real hayrick." If there be this great range in the case of such an eminently good sitter as a hayrick, what must be said of the portrait-painter's work? What help can we expect from a portrait in forming an idea of even what a man's outward appearance is like, to say nothing of what his character is? Some historical portraits are done in triplicate, the group including a front view and the two profiles. This gives us a certain amount of help, but for a complete illustration of the appearance of an historical character we would require a gallery of portraits. Were it not that Velasquez was a court painter, we might look to his many pictures of Philip IV. as at

[1] Camille Mauclair, *The French Impressionists*, English translation, p. 103.

least approximate material for forming an idea of how that monarch really looked.

In view of all this limitation in the case of persons who really existed, what are we to say when we come to deal with matters in which there is no longer any standard in existence? If we are so doubtful about the mere face of an important character in an historical scene, we can realise to some extent how helpless we are in the hands of the historical painter. There are indeed as many Fields of the Cloth of Gold as there are painters who have ventured to reproduce the scene. Naturally this raises the question of the value of pictures in text-books of History. Some teachers object to any picture that does not confine itself to the mere details of dress, architecture, and general archaeological matters of which we have certain knowledge. From this point of view historical illustration is a sort of antiquated fashion plate. The ideal illustrations would have to be culled from the learned German tomes that contain reproductions of the fluctuating fashions throughout the centuries.

Such teachers maintain that all pictures describing an actual incident must of necessity be wrong. The one thing that may safely be asserted about the incident is that, however it happened, it did not happen in just the way the painter has represented. Mathematical laws are invoked to prove the infinitely remote chance of all the combinations coming right in a given representation of the incident.

If you care to go to the Ashmolean Museum at Oxford, you will find under a glass case certain pieces of old iron that are labelled as being the identical lantern used by Guy Fawkes on that fateful fifth of November. It does not appear that

there is any question about the genuineness of the debris, and visitors are sometimes able to get up quite a pleasant degree of excitement at the sight of the scrap-iron. The fashion-plate teachers regard the remains with favour, and would willingly provide all schools with at least a photograph of them in the unavoidable absence of the inspiring originals. To these teachers a spirited picture of the arrest of the traitor is regarded as dangerously misleading, because it cannot possibly be "true." We may ask with a distinguished American novelist—

> Do these little people know that Scott's archaeology was about one thousand years "out" in *Ivanhoe*, and that to make a parallel we must conceive of a writer describing Richelieu—say—in small clothes and a top hat? But is it not Richelieu we want, and Ivanhoe, not their clothes, their armour?[1]

All the same, while a protest is necessary against the excessive attention given to archaeological details, there is nothing to be gained by deliberately neglecting them. *If* Scott is one thousand years wrong in his archaeology, it is something to be condoned, not admired. Veronese's picture of the "Marriage at Cana" is perhaps none the less a masterpiece though he has put the people into the clothes of his contemporaries; but the work is not improved by the anachronism. As teachers we must be as accurate as we can without becoming pedantic.

The points to be determined in connection with a picture of an historical scene as illustration are mainly two; the one negative, the other positive. First, the picture must not contain anything that contradicts historical evidence; it must be consistent with all that we know of the period. Secondly, it

[1] Frank Norris, *The Responsibilities of the Novelist*, 1903, p. 17.

ought to throw some light on the scene depicted; it ought to embody an idea.

It is obvious that a picture may fulfil both these conditions and at the same time do a great deal to teach the details of the dress, architecture, and mode of living of the time. The danger is that these details may become too prominent and the picture acquire that purposeless air that marks the fashion plate. A novel with a purpose is usually a poor novel because it was not the writer's main purpose to make a good novel. So the fashion-plate picture fails because its purpose is to be a good fashion plate and not to be a good picture.

It has to be remembered that every picture, historical or other, however well executed, limits the mind of the spectator in dealing with the scene depicted. Once a set of elements have been combined in a definite way, the mind finds it difficult to break up the connection and recombine them. Young clergymen of great ability and originality have complained that they had to give up reading the published sermons of Robertson of Brighton, for the reason that once they had read one of these sermons the text remained ever after a forbidden one for them, since it was impossible to preach upon it without seeming to have plagiarised. The treatment of the subject seemed to them so thorough and altogether so satisfactory, that there appeared to be no other way in which it could be properly dealt with. The same difficulty is experienced by any one who wishes to make a new illustration of some principle that is stated and particularly well illustrated in a text-book. The combination of elements is so well made in the original illustration that the reader finds his way

blocked. He may break up the illustration into its constituent ideas, but these show a strong tendency to recombine on their old lines. While this is true of all sorts of combinations, it is particularly true of those that have been formed in spatial relations. A description of a certain incident may be given, and the hearer may make a more or less vivid mental picture of the occurrence, still as a rule this picture can be easily replaced by another. But if the scene has been expressed in terms of space and colour in an external picture, it is very difficult indeed to make a mental reconstruction. The less exact the verbal description the more dangerous is the external picture as a determining force, for the more is left to the draughtsman. Poetry, for example, is seldom well illustrated. For this there are two reasons. First it requires a poet to illustrate a poet. So far as the readers of a poet are able to appreciate his writings, so far are they also poets, though they play a more passive part than that of the poet who writes. Apart from power of execution, the minimum demand from an artist who proposes to illustrate poetry is that he should be himself at least a passive poet. The second reason is that many of the most charming things in a poem are of such a nature that they cannot be illustrated. Their merit lies in their elusiveness; a certain vagueness is of their very nature. To make a picture of Satan's massive bulk as he "lay floating many a rood," is to reduce poetry to a more or less exact science. Whether we will or no, a picture lends itself to drawing to scale.

Minds of fine calibre usually object to illustrations in both poetry and fiction. The artist interferes with their freedom. The influence of the *fait*

accompli is powerful in all departments of life, but nowhere is it more powerful than here. After seeing a picture of a character in a novel, it is very difficult indeed to conceive of that character under a different face. Strongly imaginative visuals have usually invented for themselves a very clearly defined picture of each of the characters of a story, and of characters in history whose faces have not been handed down to us. Such persons resent any picture that is not theirs. They say that this picture is not like the character, that is, not like the picture they have formed in their minds.

But on the other hand there are many who are unable to form a mental picture corresponding to a description. These welcome illustrations, and all they demand is that the illustration shall correspond to the facts contained in the text. This very simple demand is far less frequently complied with than one would expect. Authors have a standing grievance against artists for blundering in their representations of the matters dealt with in the text. The author makes the prisoner gaze gloomily at the four tiny squares of sunlight that the prison window allows to fall upon the opposite wall, and the artist represents nine tiny squares. The author complains that the artist has not read the book with sufficient care. On the other hand, the artist often complains of the carelessness of the author. An artist friend of mine had the satisfaction lately of writing to an author that if a certain character were to be depicted as doing what the author said he did, it would be necessary to draw the character with an arm twenty feet long. Indeed it is mainly in connection with illustrations that discrepancies between different parts of the text are exposed. Of the two, the author has the safer position. He

may, and frequently does, make a slip in his topography without any one being a bit the wiser. A careful examination of the work of almost any popular writer of fiction will show up some inconsistencies that have never been found out by the public, because the different parts are not confronted with each other. This confrontation is frequently forced on by the artist, whose work naturally gives itself over to criticism of this kind.

An interesting parallel may be drawn between the concept and the image on the one hand, and the author-picture and the artist-picture on the other. As the concept has the power of crystallising out into a definite image, so the author-conception of the grouping of elements may be crystallised out into the picture of the artist.

The artist stands between the author and the reader. By means of words ideas pass from the author to the reader. So far as these ideas are capable of pictorial representation they may be very vaguely set forth in the author's mind, and as vaguely in the minds of many of his readers. Some of the readers may have a much clearer and even more accurate picture than the author himself. So long as there is no flagrant contradiction between the author-picture and the reader-picture, the two may exist comfortably side by side without either author or reader being aware how different the two pictures really are. This agreement in difference is possible only because there is no objective standard to which both pictures may be referred. The moment the artist comes along, his picture supplies the missing standard, and both author and reader are able to compare their picture with this external standard. Very often the artist's picture corresponds neither to the author's picture

nor to any of the pictures formed by the readers. Indeed, it would be very wonderful if the artist's picture did coincide at all points with any other picture. On the other hand, in the case of a careful and skilful artist there will probably be no justifiable difference between the author's account and its translation into terms of space. Each reader will probably say: "Well, it is not just what I thought it would be, but it is quite in keeping with what the book tells us, so I suppose it's all right."

It sometimes happens, indeed, that a reader of exceptional experience may have a truer picture than either the author or the artist; if by truth we mean fidelity to things as they really are. An author, for example, lays the scene of his story in a country that he has never visited. He has carefully read up his subject, and has acquired quite a store of second-hand local colour. The book is illustrated by an artist who also has never visited the country, and the illustrations are quite satisfactory to the author, who has no objective standard by which to test them. On the other hand, a reader who knows the country in question might read the unillustrated book with pleasure and understanding and never suspect that its author had no first-hand knowledge of the country, for this reader would interpret all that was said in terms of his own experience,[1] and would form for himself correct pictures without suspecting that they did not correspond to what had been in the author's mind. Naturally if the author goes

[1] An excellent illustration of what goes on unconsciously in the mind of such a reader is to be found in the twenty-ninth chapter of *Ivanhoe*, where the wounded knight consciously and deliberately interprets what Rebecca tells him about the doings of the besiegers of Torquilstone Castle.

into detailed descriptions he is almost sure to betray himself to the reader who really knows, but he has at least a chance of getting off undetected, and I have known several cases in which such an author has been quite successful. But so soon as an illustrated edition falls into the hands of the specially well-informed reader, discrepancies are at once detected.

It is much easier to hide one's ignorance in writing than in drawing. No doubt if a manuscript by an author depending upon second-hand knowledge is submitted to minute analysis by a person well versed at first hand in the matter described, it is almost impossible for it to stand the test. But the artist is in a much worse case. He plays with his cards on the table. He has a certain space that he must fill somehow or other. No doubt he is able to arrange matters so as to hide a certain amount of his ignorance. He may so place his figures that certain portions of their attire or accoutrements are not seen; he may foreshorten certain lengths of which he is not sure, and make the laws of perspective responsible for any apparent discrepancy; above all, he may vaguely suggest certain possibilities and leave the observer to fill in details at his own responsibility. This last method transferred to the realm of letters is that adopted by the ordinary author. In any case, the worker in words is not called upon to describe anything he wishes not to describe. He is at liberty to select for description whatever pleases him. The artist, on the other hand, must meet his difficulties. He cannot merely omit them; and when he seeks to evade them, he has to do so in a way that is easily detected. In a certain sense the artist may be said to be called

upon to do the necessary elaboration of the author's meaning. It may be enough for the author to remark that there was a cupboard in the corner. He need not concern himself about what sort of cupboard it is; but the artist must make it some definite kind and shape of cupboard. He must in fact elaborate the idea. Some artists go in for far more detail than do others, but in every case they must go into greater detail than the author, wherever space relations are involved. Certain artists show great skill in giving just the right amount of detail, and in suggesting the rest. Others lean rather to the methods of Walt Whitman, and provide a series of elements in their spatial relations so that the content of the description may be made out without any effort on the part of the spectator.

Since young people are necessarily in need of as much detail as can be communicated to them without undue strain, there can be no harm in using pictures copiously in teaching. Naturally it is desirable that the idea of the picture as a whole should be the true idea, so that in the future the pupil may not have to unlearn anything. The exceptionally capable pupil may occasionally resent the restraint on his imagination imposed by the artist's work. But the average pupil, so far from resenting the artist's guidance, feels grateful for combinations of ideas that he could not have made for himself. Not only does the picture supply combinations; it gives the elements as well. By the very fact that the artist is compelled to fill his space, he has to introduce many details that do not appear in the text at all. It would be intolerably tedious to state in writing a great many things that the artist can represent by a few strokes. It

is easy for the artist to depict in a few square inches of book space what would take pages of descriptive writing to set down in a much less effective way. Further, it is much easier for the pupil to interpret the picture than the text. By a mere glance he gathers in a harvest of the eye that could hardly under any circumstances be gathered from reading. It is a healthy sign that teachers are now paying great attention to the pictures in the text-books. Formerly it was assumed that the pictures were the children's affair; they were regarded as mere attractions, things to please the pupils. Now, teachers use the pictures as an integral part of the lesson. In many cases, indeed, the picture becomes the core of the lesson. In composition, for example, a picture is often chosen as the basis of a story or explanation. But this is obviously not a case of illustration. The picture is being used for its own sake and not in relation to something else upon which it casts light. Frequently a picture that was meant by the artist to illustrate one thing may be used by the teacher to illustrate another. Such pictures as "The Derby Day" and "The Railway Station," that were meant by the painter (W. P. Frith, who by the way began his career as an illustrator of our English classics) to illustrate the humours of his time, may be used by the teacher as illustrations of the dress and general background of the early Victorian period.

We have seen that all pictures are more or less abstract. As a matter of fact, we may arrange pictures in a regular series of classes of ever-increasing abstractness till in the final resort we reach a stage that is not really pictorial at all, but diagrammatic. It is impossible to draw a hard-and-fast line between the picture and the diagram,

for there is really a long series of degrees of abstractness from the all but complete representation of an actual object or scene at the one end, to the complete reduction to one class of relations at the other.

The necessary and sufficient mark of the picture is that it seeks to reproduce the object as it appears to the eye. The diagram, on the other hand, isolates certain relations, and by isolating emphasises them, and thus frees them from complication with others. Generally speaking, the picture may be said to deal with things as they appear, the diagram with things as they are. The picture works by appealing to suggestion; the diagram seeks to eliminate suggestion altogether, or if it makes use of suggestion, limits it strictly to one particular line of action.

The abstractness of an ordinary picture is made clear when we consider the conventional element in drawing and painting. We are apt to think that what we call a true reproduction of nature necessarily conveys to the human mind the impression of the original. To many it seems superfluous to write and publish such a book as Mr. Robert Clermont Witt's *How to Look at Pictures*. But here we have 160 large pages of print explaining what is usually taken for granted. Pictures are generally supposed to be self-interpreting, at any rate, in so far as they reproduce scenes or objects from the real world. Yet, leaving out of account the technicalities of the schools, there remains the fact that we have in the most literal sense to learn how to look at pictures. Psychologists have found that illiterate and savage people do not at all understand what is meant by a given picture. They have a grain of salt for the story of the

Greek artist Zeuxis who painted some cherries so naturally that the birds came and pecked at them. In the case of the savages of Borneo, it has been found that they do not recognise the portrait of a man as a man at all, to say nothing of being a likeness of a particular man.[1] It is clear that we read into our pictures more than is actually there.

The picture-maker must vary his method according as his purpose is to give aesthetic satisfaction or to impart knowledge. It is of course possible for a picture to do both; but for purposes of illustration the informative side is of more consequence. So soon, however, as the purely informative aspect dominates, there is a danger of serious damage to the other. A glacier painted by an artist for his own satisfaction and the pleasure of his patrons is a very different thing from the glacier painted to illustrate a geological lecture. When Messieurs Lecerf and Petit let themselves loose on their cartoons for teaching *La Morale par Exemple*,[2] the artistic conception and execution are hardly worthy of the fine lessons they teach. On the other hand, it is quite possible for the artistic sense to have too free play for the results to have any informative value. Such illustrations as those of Cruikshank have no doubt an illustrative value. They illustrate the spirit of the text. They owe whatever charm they possess to their whimsical suggestiveness. But on the informative side they are worse than useless. The figures are unnatural,

[1] Dr. C. S. Myers tells me that this does not apply to the higher of the two grades into which the Borneans whom he has studied are clearly classifiable. See also G. J. Romanes, *Mental Evolution in Man*, p. 188.

[2] *Collection publiée sous la direction de M. Edouard Petit, Inspecteur-Général de l'Instruction Publique.*

not to say impossible. But the reader is willing to accept them in connection with a certain class of book, and to interpret the text by their means. They are a sort of humorous diagram. We feel that if they have a place anywhere it is in the pages of Dickens; in Scott they are objectionable.

On the purely informative side, illustrative pictures leave as little as possible to the mind of the observer. Suggestion must be called into play; but only the most obvious suggestion is used. The real is not here sacrificed to the phenomenal. The illustration of advertisement gives examples of this sort. At any of our railway stations may be seen pictures of the removal vans used by various firms. In most cases the vans are drawn in an impossible position. They are represented with their long sides parallel to the picture plane, which is very convenient, since the printing on the sides of the van can thus appear exactly as in a book, without the disadvantage of foreshortening. On the end of the van, naturally, the printing should appear to vanish towards the centre of vision. The advertisers probably are perfectly aware of this, but as foreshortened printing is not so emphatic as the straightforward kind, they prefer clearness of printing to accuracy of drawing, and simply represent the end of the van as if it also were parallel to the picture plane. No great harm is done. The ordinary observer is not at all concerned with the breach of rules of perspective. This I have tested by more than one hundred separate inquiries. Experience shows that when questioned as to whether there is anything wrong with the poster the ordinary intelligent observer makes some comment or other either about the kind of printing,

the colour of the poster, or the removal-conditions quoted. All of which is a full justification of the practical wisdom of the advertiser, whose business it is to remove furniture and not to educate the public. Obviously the teacher must take another view.

This desire to combine the picture element with the diagrammatic has led to the invention of the isometric mode of projection. The draughtsman wishes to suggest the appearance of the object as a whole, and yet does not want to give up the advantage of drawing to scale and making measurements from his drawing. Accordingly, he has hit upon the plan of drawing all his horizontal lines at an angle of thirty degrees with the horizontal edge of the paper, and thus always presenting a corner projection of the object in such a way as to look not altogether unlike the real object, and at the same time to allow the draughtsman to make measurements on and from his drawing.

The compromise here effected in the interests of utility is paralleled by a compromise effected in the interests of art in the Eastern monumental reliefs. The Assyrian bulls in the British Museum, if looked at full in front, show up a pair of forelegs, just as we would find if we viewed a real bull from this standpoint; and if the relief is looked at from the side, four legs are seen, just as would be the case if we observed from the side a bull in the act of walking. If now the observer takes a mean advantage of the old sculptor and looks at the relief bull from a point midway between the front and the side, he sees the animal with *five* legs. As an informative illustration this bull is a failure, but as an artistic production it has the advantage of preserving the illusion of

naturalness from the two most important points of view, the front and the side.

The pictorial series in order of increasing abstractness may be thus summarised :—

(1) Realistic pictures in which nothing is left to the imagination but the work of combining the elements supplied, *i.e.* in interpreting the lines and colours according to the ordinary conventions, so as to call up the impression of the actual scene.

(2) Conventional pictures in which the elements must be combined according to a more or less arbitrary but intelligible convention. To this class belong examples of the more *outré* schools of painting that require special training to understand. Lead glass-work in ecclesiastical decoration would clearly belong to this class.

(3) Diagrammatic pictures in which various more or less mechanical conventions are recognised. To this class belong such drawings as those worked on the isometric system, or any similar recognised system.

(4) Diagrams in which the drawing is not in the ordinary sense quite like the object represented, but corresponds to it in certain points. Plans and elevations, for example, are not really like the objects, and yet, as they correspond to them in space relations, they may be said to resemble them. To this class also belong all manner of maps, and that large class of drawings that in biological and other scientific text-books are labelled "diagrammatic." These drawings retain a certain resemblance to the original objects, but the draughtsman has taken the liberty of suppressing whatever elements he has found it inconvenient to introduce. The main purpose of this kind of diagram is to divide and conquer. In dealing with the vascular system,

for example, it is a positive disadvantage to have the diagram loaded up with details of the nervous system. There is a place for the nervous system by itself, and also along with the vascular. But this combined presentation belongs to a different stage of teaching. This class of diagram does suggest the real appearance of the objects represented, but only in a vague way. The vagueness is no disqualification, for the general appearance of the object is not at this stage important.

(5) The final stage is reached when we come to those diagrams in which we have one fact represented by another with which it has no apparent connection. The two elements are wholly disparate, save in respect of the one element in which they are compared. There is no connection, for example, between a straight line and the amount of wool exported from Australia, and yet the varying state of the export trade in wool may be well illustrated by a series of lines of different lengths.

CHAPTER XV

THE DIAGRAM

The relation between the picture and the diagram as means of illustration may be brought out by a consideration of the relation between the easy and the simple in teaching. These two terms are sometimes taken to be synonymous. But everything depends upon the stage the pupils have reached in the subject under discussion. We have seen that while a generalisation is simpler than the mass of details from which it has been drawn, it is easier only to those who have mastered the details and thus earned their generalisation. So with graphic illustration. Speaking generally, the diagram is simpler than the picture, and yet the picture is in most cases easier than the diagram. If we follow the principle, from the simple to the complex, it would seem that we ought to begin with the diagram and rise to the picture. The teacher, however, is driven to reverse the process if only to be consistent with the other teaching principle, from the concrete to the abstract. We have here a practical example of an only too prevalent tendency to pit one principle against another in an unintelligent way. So soon as we take a wide enough view, we find that the two principles are quite consistent.

In point of fact, the place of the picture is both at the beginning and the end of a process of teaching. At the beginning it gives a general idea of the whole with which we are dealing. This can be grasped in a more or less vague way. There then ought to follow a study in greater detail, in which certain elements have to be treated by themselves. Here the diagram is obviously in place, and may be used with whatever degree of abstractness is required. When the detailed study has been completed for that particular stage, the picture should once more be introduced to gather up the pupil's new knowledge and fit it into its proper place. In each teaching unit involving graphic illustration we should begin with the picture and end with the picture. All between is the domain of the diagram.

Yet so strong is the power of the picture, that it remains immanent throughout the process, and is ready at any moment to obtrude itself. A diagram seems to have an inherent tendency to acquire content and become a picture. Since the value of the diagram is its abstractness, it is clear that a loss of abstractness is a loss of the virtue of the diagram as such, except in so far as the pictorial element is consistent with the diagrammatic. The general sense of the solidity of the heart that obtrudes itself upon the flat diagrammatic representation of it, does not in any way hinder the diagram in its illustrative work. But if we are dealing diagrammatically with a question of quantity, and the picture element introduces the question of quality, the pictorial influence is prejudicial.

This is well shown in some of the popular methods of diagrammatic representation. It is now fashionable to represent quantities pictorially rather than diagrammatically in the strict sense of the

latter term. For instance, it is desired to convey a vivid impression of the amount of tobacco smoked in his lifetime by a man who consumes so many cigars per week. This is supposed to be best represented by a drawing in which the cigar bears the same ratio to the man that the weight of tobacco consumed during the man's lifetime bears to his own weight. Accordingly, a mannikin is represented with an enormous cigar in his mouth. No doubt the area of the cigar as represented by square centimetres has the same ratio to the area of the man in the same denomination, as the number of pounds of cigar has to the number of pounds of man. But while we have thus an appearance of mathematical accuracy, the only effect produced upon the observer is the impression that the man smoked a very great number of cigars. On the whole, the statement in words of the number of pounds of tobacco and the number of pounds the man weighed would convey a clearer idea of the situation than the diagram does. It is commonly said that the illustration is much more interesting when put in the pictorially diagrammatic way. But the gain in interest is at the expense of relevancy. The sizes of the armies of Europe may be represented by a series of soldiers dressed in the uniform of the respective countries, each soldier being made of a certain size, according to some standard so as to represent the size of the army of his country. The resulting impression is not at all clear. It is complicated in two ways.

In the first place, we have the introduction of quality where it has no place. While we are considering the size of the armies of Russia and Italy, we have nothing to do with the peculiar cast of countenance of a Russian or an Italian; yet these qualities are thrust upon our notice in the drawing.

No doubt the appearance of the men, their uniforms, and their weapons are of the utmost consequence in considering the value of the various armies. But this particular diagram is used to illustrate only the one element of size. The rest may be illustrated in various ways. Some parts of the whole illustrandum may be best represented pictorially, as for example the weapons and accoutrements; but wherever statistical elements alone are involved, the pure diagram will be found to be most serviceable, and least apt to convey false impressions.

The second source of complication in the pictorial diagrams is the introduction of the element of area. If the mere height of the soldiers represents the size of the army, then clearly a series of straight lines would, for illustrative purposes, serve better than the pictured figures. But if the numerical proportion of the armies to one another is represented by the area covered by the figure of the soldier, then a very serious difficulty is introduced. The ordinary reader can compare straight lines with very little difficulty. But the comparison of areas is beyond him. Any one who has not given the matter attention will be surprised at our general weakness in estimating area. We are all singularly feeble in the matter of comparing the relative sizes of surfaces, and in particular, in correlating lengths with areas. We can compare two lines with each other with a fair chance of justly estimating their ratio, but few among us can make even a reasonable guess at the relative areas of two given circles or squares. To prove how easily we may be misled in comparing lines with areas, ask any friend who has not had the experiment already imposed upon him, how many threepenny pieces we can place flat on the

surface of a half-crown without any one of them overlapping, however slightly, the circumference of the larger coin. The answer varies from three to five. The fact, however, is, that even two three-penny pieces are more than the half-crown can receive on its surface under these conditions. Take two small coins, say shillings, and place them on a table at such a distance from each other as you think will leave room for one other shilling to fit in

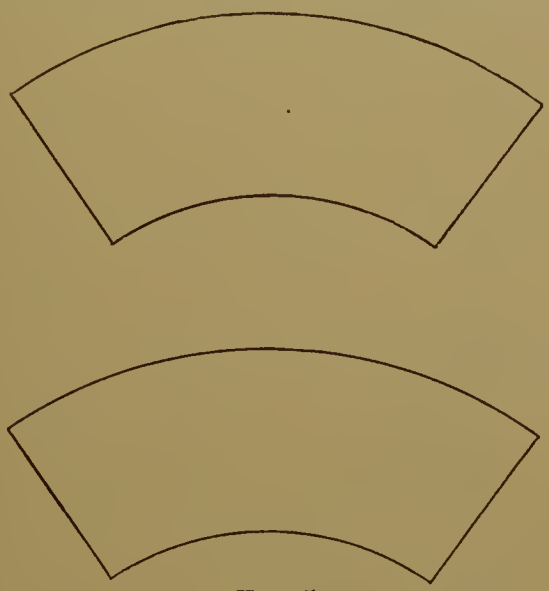


FIG. 5.

exactly between the two. When you have tested your result, you will probably find that you are considerably wrong in your calculation, and that any friend with whom you experiment goes wrong in the same direction as yourself. You are really trying to determine the length of the diameter, but the area of the coin leads you into error. Our weakness is shown also in our inability to guess correctly, without previous practice, the height in inches of a silk hat resting on its crown. Further, take two pieces of paper, and putting the one above

the other, cut out in duplicate the shape indicated in Fig. 5. You will then have two pieces of paper of exactly equal area, but if you place them one below the other as in Fig. 5, you will find it very difficult not to maintain that the lower of the two is greater than the upper.

Psychologists supply us with many examples of false impressions conveyed with regard to areas, lengths, and directions, and one would almost think

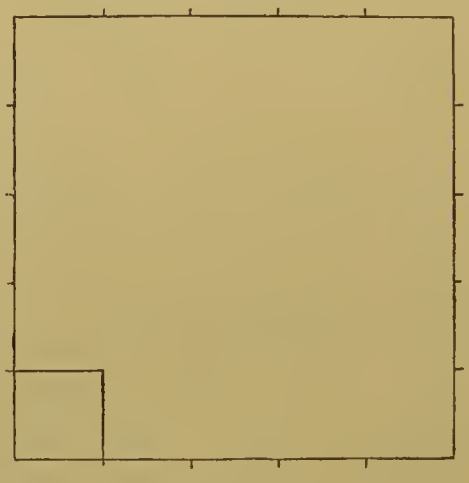


FIG. 6.

makers of diagrams deliberately selected modes of representation that illustrate certain of the psychologists' illusions.[1]

It is customary to represent the areas of countries and continents by a series of squares or triangles; and at first sight it may appear plausible to maintain that since we are illustrating areas, the best illustration is surely other areas. It may even be asked, if we cannot compare intelligently

[1] Lightner Witmer in his *Analytical Psychology*, chap. iii., particularly pp. 86-98, gives some exceedingly interesting, and from the teacher's standpoint most instructive, illustrations.

little areas like printed triangles and squares, what hope is there that we can compare areas like those of continents and countries? Now it has to be admitted frankly that most of us have no real conception of what is meant by the hundreds of thousands of square miles that we read about in our geography text-books. But it is one thing to know a matter absolutely, and another to know it relatively. It is one thing to know what is meant by the statement that India contains 1,574,450 square miles, and another to realise that its area is a little over twenty-five times that of Scotland plus Ireland. We may not be able to realise the vast extent of the country, but we may be able by comparison with another country that we know a little better to make certain practical applications of our knowledge of its actual area. If we have a standard area[1] that we really know by having walked or driven over it, we may on that basis build up a scale which we can intelligently use. The bigger the available unit the better. An additional advantage follows in cases where the pupil is able to compare by actual inspection a smaller unit than his standard, so as to determine how many times this smaller unit is included in the standard unit. If the comparison could be still further extended so as to include, as forming parts of a higher unit, one or two units of about the same size as the standard unit, then a still better basis for future comparisons would be obtained, for the pupil would have had experience of the scale both downwards and upwards.

But granting the standard, there remains the question of the best means of graphically representing the unit and its multiples. Here the text-books are again in favour of reduced areas. India is

[1] See p. 311.

represented by a square of say $2\frac{1}{2}$-inch side, and in the corner the area of Scotland plus Ireland is represented by a square of $\frac{1}{2}$-inch side. If the two squares are left thus, they do not give a very clear impression of the relative sizes of the two countries. It is found by experiment that a class gets a better comparison between the two squares in Fig. 6 if the sides of the larger square are marked off into five equal parts, and still better if the whole square

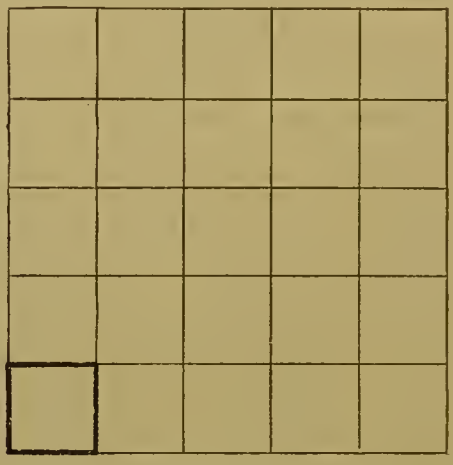


FIG. 7.

is marked off into twenty-five squares of the Scotland plus Ireland size, as in Fig. 7.

From the ordinary atlas the pupil is apt to get a distorted view of the relative sizes of the countries of the world. Each country and continent has a map to itself on a sheet of its own, so that Asia, Germany, and Scotland all appear to be of the same size; the only help the pupil gets being the little scale of miles that he is very apt to overlook. Wall-maps have the same defect. Some publishers adopt the reasonable plan of inserting in the corner of maps that are drawn on a very small scale a little outline map of some standard country drawn to the

same scale. Thus the British Islands might well appear in the corner of maps of the continents, India, China, Australia, and the United States. To illustrate the relative sizes of the countries an ingenious teacher first made a tracing from the wall-map of Europe, then he coloured each of the countries with a flat wash, next he cut out all the countries and mounted Russia on a sheet of paper

COMPARATIVE VIEW OF THE AREAS OF THE CONTINENTS, REDUCED TO SQUARES.

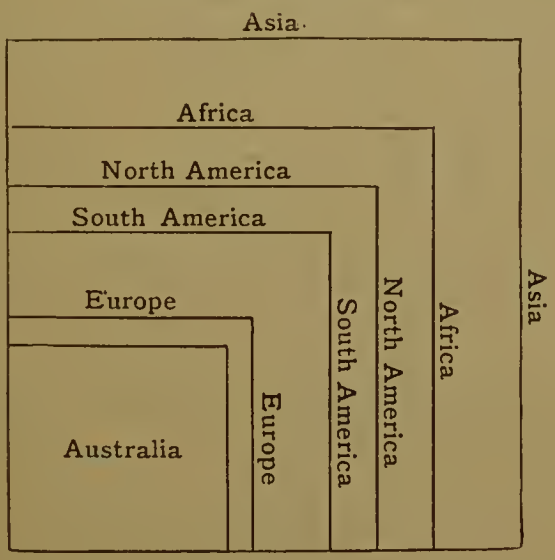


FIG. 8.

Reproduced by kind permission of Messrs. William Collins, Sons, & Co., London and Glasgow.

that just comfortably received it. After this he got a series of sheets of paper of the exact size used to mount Russia, and pasted on each of them one of the other countries of Europe. The amount of white margin in the case of small countries like Denmark and Belgium certainly emphasised their relative poverty of area.

The accompanying diagram, Fig. 8, represents an

attempt to illustrate the areas of the continents.[1] It is found in practice to be of very little service. In order to test its utility I experimented in several towns with many classes of pupils of various ages from twelve upwards. The area of one of the continents was given, and the problem set was to estimate from the diagram what the areas of the other continents were. The answers were very wide of the mark, and certain interesting variations were observed. The worst results were obtained when the area supplied was that of Australia; the next worst when Asia was the standard; the best results followed when either North or South America formed the starting-point. Classes that had studied mensuration did better than those that had not. I was able to eliminate the difference in age, for I managed to get four classes of boys of the same age, two of which had studied mensuration and two had not. A further peculiarity was that when the diagram was put in the form of a series of six squares standing outside of each other, and arranged in order of size, the results were better than when the squares were so placed as to have one angle common. The explanation is probably that there was greater "interference," in the sense that term bears when used in Physics, when the squares were superimposed.

Conspicuously better results were obtained when two of the six areas were given; the best results of all being obtained when Europe and Africa were the continents selected as standards, though Asia and Australia made a combination that had results very little inferior.

In point of fact, however, the following table that accompanies the diagram in Mr. Macturk's

[1] John Macturk, *Elementary Physical Geography*. p. 17.

book gives a more useful presentation than does the diagram :—

SIZE OF THE CONTINENTS (INCLUDING ISLANDS).

	Greatest Length.	Greatest Breadth.	Area in Square Miles.	Comparative Size.[1]
Europe . .	3400 m.	2450 m.	3,700,000	1
Asia . . .	6700 m.	5400 m.	16,400,000	$4\frac{1}{2}$
Africa . . .	5000 m.	4600 m.	11,100,000	3
N. America .	5600 m.	3120 m.	7,600,000	2
S. America .	4500 m.	3000 m.	6,800,000	$1\frac{5}{6}$
Australia . .	1900 m.	2400 m.	3,000,000	$\frac{5}{6}$

In the table the areas are given in sufficiently round numbers to admit of easy comparison with each other, a comparison that is further aided by the "comparative size" column. Taken *along with* the table, the diagram may be said to be helpful; but if the teacher has to choose between the comparative-size column and the diagram, he will be well advised to give up the diagram. The illustrandum being the column of "area in square miles," the comparative-size column will certainly be a better illustration than is the diagram. When a class is confronted with the squares in Fig. 8 without any indication that they represent continents, the pupils are found to be incapable of estimating the relative areas of the squares. Given the area of the Europe square as 100, only two out of a class of 75 post-graduate students estimated with reasonable correctness the areas of the remaining five. Eighteen of them estimated the largest square as between 700 and 800. The general impression

[1] Take Europe as the standard of comparison.

produced by the students' estimates was that the diagram by itself confused rather than helped.

Still less hopeful is the accompanying diagram, Fig. 9, intended to illustrate the relative areas of the British Isles and the British Empire. The wider circle has an area one hundred times as great as has the small black circle in the centre. The actual area of the British Isles is estimated in round



FIG. 9.

numbers at 120,000 square miles, and the area of the British Empire at 12,000,000 square miles. The diagram is supposed to make this ratio clearer than the figures themselves. I have placed a large copy of the diagram drawn to scale before about thirty classes of pupils between twelve and fifteen years of age (representing altogether 1245 individual pupils), without giving any hint about what it represented geographically. The only question asked was: how many times is the big circle bigger

than the little one? I made the same test with various classes of undergraduate students (453 individual students in all) of ages 19 to 22. The following is the percentage results of the estimates formed by the various pupils :—

	Group I. Pupils 12-15.	Group II. Pupils 19-22.
Under 100 . .	56·2	30·1
Exactly 100 . .	15·7	29·0
Over 100 . . .	28·1	40·9
	100·0	100·0

Naturally the older pupils made fewer wild guesses than the juniors. In Group I. 17·2 per cent estimated the area as under 20 times, in Group II. only 2·3 per cent made this low estimate. But strangely enough, while of Group I. only 8·0 per cent estimated over 300 times, 9·3 per cent of Group II. made this exaggerated estimate. One striking difference between the two groups is that there is much more "round-number" work among the first group. The second group quite obviously deal with squares of numbers, while the first group have exactly 50·7 per cent of even-number guesses — *i.e.* 20, 30, 40, . . . 200, 300, 400, &c., up to 1000. In Group I. 2·5 per cent estimate exactly 1000. Only one student in Group II. makes this loose guess. In the first group one pupil guesses 5000, and one actually goes the length of 10,000. The great majority of the guesses are in fact quite wild. About a dozen pupils in Group I. give such inexplicable answers as "They are as big as each other." But a good many must have thought what one pupil had the courage to write: "One cannot tell how much bigger, as the small one can go into it almost as many times as one likes."

In the case of Group II. it appears likely that 29 per cent represents the real proportion of those who estimated 100 correctly. The same can hardly be said for Group I. The tendency to select round numbers is so marked that we must make allowance for the pupils who are specially attracted to 100 because it is so pre-eminently a round number. Thus while 15·7 per cent guessed 100 exactly, no fewer than 12·04 per cent guessed 50 exactly, while 5·5 per cent guessed 200 exactly.

The important result of the experiments from the point of view of Illustration is that the diagram gives no real help in estimating the relative sizes of the British Isles and the British Empire. Can it be maintained that the illustration works the other way? If the pupils are unable to estimate that the big circle is a hundred times bigger than the little one, are they at all likely to be clearer about the ratio of 1 to 100 by looking at the diagram? If not, can the diagram be said to serve any useful purpose? The answer would appear to be that, taken in connection with the actual figures, there may be a certain aesthetic satisfaction in seeing the diagram. It may therefore help in fixing an impression that is made by other means, but its effect must be recognised to be aesthetic not didactic.

This difficulty of the circles has evidently struck teachers, for in a text-book[1] just published the same fact is represented by squares in a diagram that, thanks to the courtesy of the publishers,[2] I am able to reproduce here as Fig. 10. So far as the British Isles and the British Empire are concerned, the squares are a great improvement

[1] *A General Geography of the World*, by Henry E. Evans.
[2] Messrs. Blackie & Son, London and Glasgow.

on the circles, the little squares in the centre being a very ingenious device. As a matter of fact, pupils almost invariably accept the arithmetical challenge of the diagram and count the ten squares along the bottom line and the ten squares along the vertical line, and thus actually discover that there are 100 small squares within the big one.

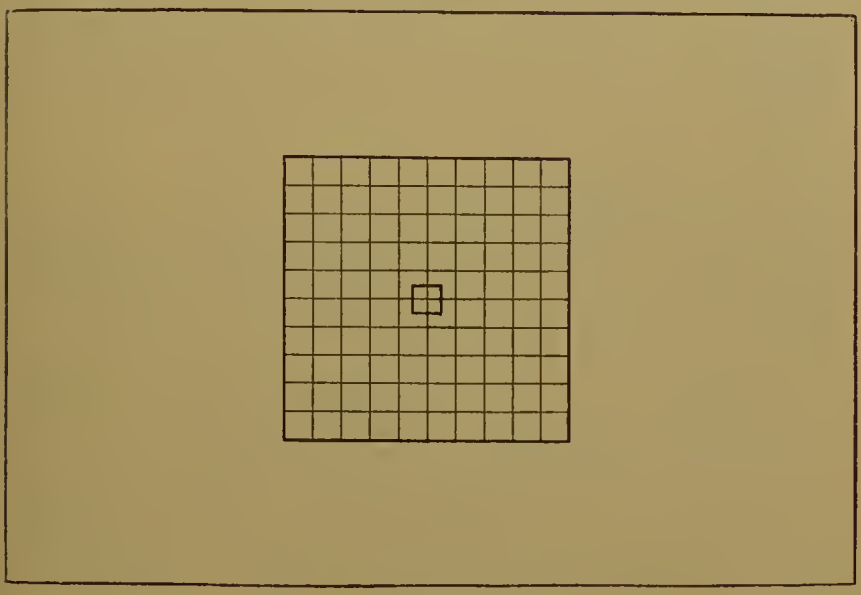


FIG. 10.

The figure shows the proportion the British Isles bear to the Empire (1 : 100), and to the land area of the globe (2 : 900). The whole represents the land area of the globe, the checked part the Empire, and the central square the British Isles.

Reproduced by kind permission of Messrs. Blackie & Son, London and Glasgow.

But the illustration is less happy in dealing with the rest of the land surface of the globe. To begin with, it seems a mistake to change the unit in the second case. The ratio of 1 : 450 would retain the small central square as the unit of the whole rectangle, and after all is expressed in as round numbers as 2 : 900. By retaining the original unit the area of the British Empire square may be

compared with the whole rectangle. It is easier to understand that the whole is four and a half times the British Empire than to understand that it is nine times half that Empire.

Geometricians discriminate between what they call diagrams of illustration and metrical diagrams. The first kind

> are intended to help the reader to follow the mathematical reasoning. The construction of the figure is defined in words, so that even if no figure were drawn the reader could draw one for himself.[1]

The second kind are

> employed in an entirely different way—namely, for purposes of measurement. The plans and designs drawn by architects and engineers are used to determine the value of certain real magnitudes by measuring certain distances on the diagram.[2]

The diagrams we have just been dealing with must be regarded as more or less illegitimate examples of the metrical kind. No doubt they are used to illustrate certain relations, but these relations are of a purely quantitative nature. On the other hand, they are not set out so that measurements may be taken from them. No doubt we could calculate from them the relations they illustrate, but this is certainly not the function they were introduced to perform. Rather are they called upon to illustrate calculations that have already been made. They are, in fact, a hybrid between the two classes.

In spite of the literal meaning—"marked out by lines"—the term *diagram* may be applied to

[1] How far this is true of the ordinary reader may be tested by asking some one to read the *Meno* 82-85 from a text without a diagram, and then make an illustrative diagram to suit. Few indeed will be able to supply what is wanted.

[2] J. Clerk Maxwell in the *Ency. Brit.*, ninth ed., vii. p. 149.

drawings in which colour plays an essential part. The areas in the drawing may indicate one set of facts, while the colours that are washed in over the areas may indicate another. The areas may, for example, indicate quantitative relations, the colours qualitative. In the geological map the extent of the various strata is indicated by the area set apart for each, while the nature of the strata is indicated by the colours: *black* may indicate coal, *yellow* chalk, *red* volcanic rocks, and so on. It is to be noted that here we have another example of the immanence of the picture in the diagram. There is a natural connection between black and coal, and between red and the rocks that are produced by fire. The same feeling after the pictorial is seen in the maps illustrating the various levels of the different parts of the earth's surface. It is a natural convention to represent the low-lying lands by different shades of green according to their height, the higher mountainous levels by various shades of brown (points above the snow-line being left white), and the sea by varying shades of blue. But colours may be used in a completely abstract way, as in the case in which exports and imports are represented by different colours.

Sometimes colours and areas are combined for illustrative purposes. When this is done there should be the greatest care in maintaining consistency in the use of the colours. In T. G. Bartholomew's *Handy Atlas of the British Empire* there is given a page diagram of the Comparative Trade, Area and Population of the British Empire (reproduced here[1] without colour). Separate

[1] By kind permission of Messrs. Bartholomew & Co., Edinburgh.

colours are used for (1) the United Kingdom, (2) India, (3) Australia, (4) South Africa, (5) Egypt, East Africa, West Africa, (6) Canada, (7) Strait Settlements, (8) Other Colonies. Thus under *Trade* the United Kingdom swells at the head of the list in a commanding pink rectangle, in a modest pink rectangle makes a bad second to India under *Population*, and in a tiny pink rectangle takes up the second lowest place under *Area*. The diagram is effective in many ways. One sees at a glance that the United Kingdom is an easy first in *Trade*, India in *Population*, and Canada in *Area*; that Australia has a minute population in proportion to its trade and its area; that the Strait Settlements have a trade out of all proportion to their area and population; that India is much more crowded than Canada; and so forth. But when it comes to making accurate comparisons, there are certain difficulties. The diagram depends on the pupil's power to estimate areas. It is true the coloured rectangles are divided up into strips, but the advantage of this strip arrangement is lost, since there is no uniformity in the arrangement of the strips. In the Trade diagram, for example, the United Kingdom is represented by a rectangle made up of six strips, while India is represented by a rectangle made up of two strips each a little longer than half a United Kingdom strip, and Australia by two strips each a little less than half a United Kingdom strip. In order to get the full value of the comparison, India should be represented by one strip exactly the same length as the United Kingdom strip, with a little bit over to make a small strip at the foot of the big one. Australia should be represented by one strip just a little less than the United

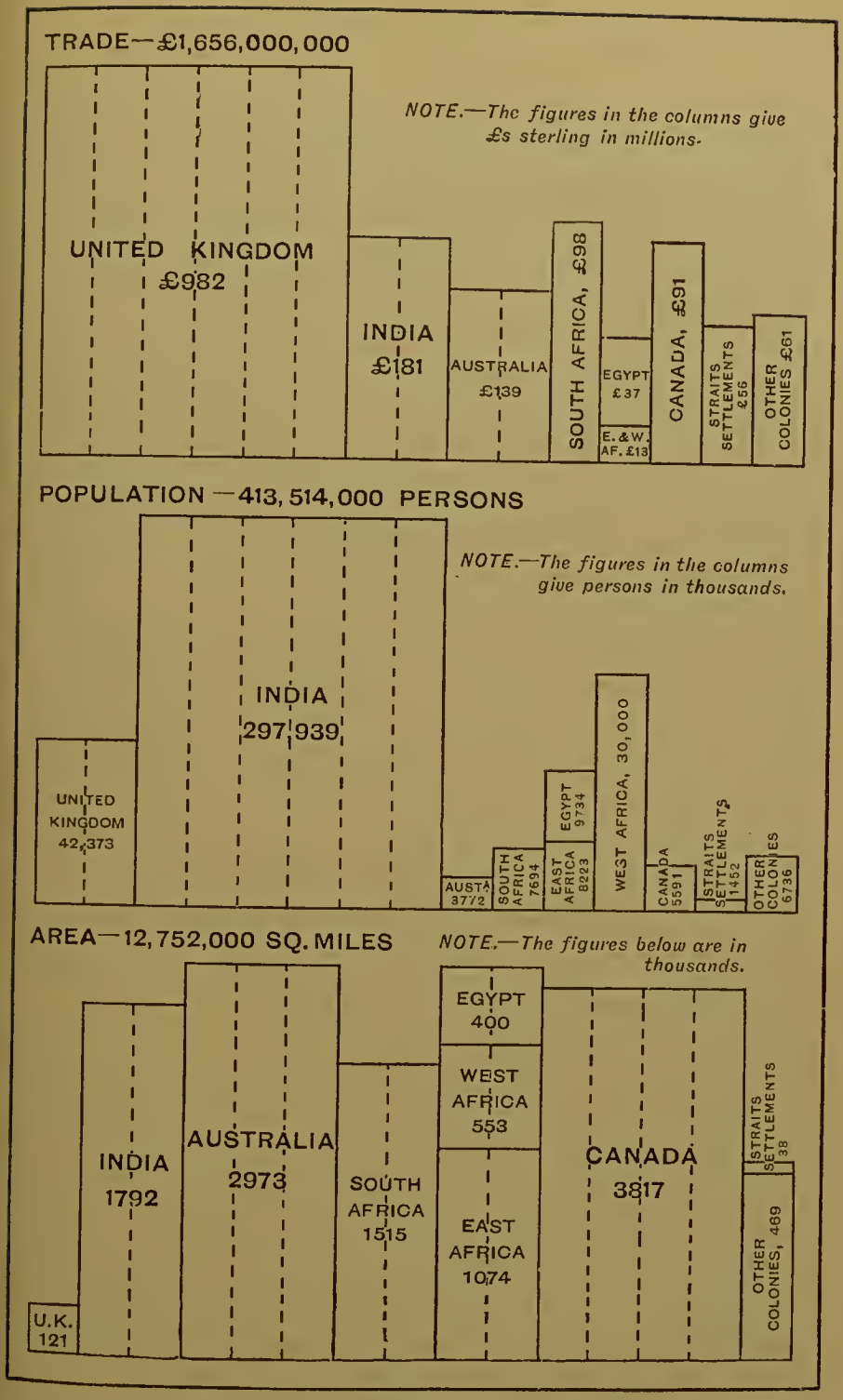


FIG. 11.

We are not here concerned with the actual figures involved. Diagrams of this kind must be kept up to date. For example, we find that in the *Statesman's Year Book* for 1909 the trade of the United Kingdom is given in round numbers as 1164 million pounds, and that of India as 250 million.

Kingdom strip. If this plan were adopted throughout, the standard would really be not so much an area standard as a lineal one—only the lines would be thicker than usual, in fact, the strips might be regarded as lines; and since they are of uniform width, the only element that would need to be considered would be the length. Had this plan been adopted, the combination and separation of Egypt, East Africa, and West Africa that causes a certain amount of confusion, might perhaps have been avoided. With regard to the confusion referred to, I speak from what happened with pupils using the book. On account of some flaw in printing, the Population diagram makes the "Other Colonies" green, though they are yellow in the other two diagrams. Pupils resent this. They want to know why. On pages 6 and 7 of the same atlas there are diagrams to illustrate the amount of the imports and exports of the British Empire stated in pounds sterling. The Import circle is naturally much larger than the Export circle. The different countries are represented by coloured sectors, each sector being of an area proportionate to the amount it represents. Round the Export circle is placed a dotted circumference representing the Import circle. But here, as elsewhere, experiment shows that, merely given the two concentric circles, the pupils are quite unable to estimate the ratio of the quantities represented. There is, however, a further difficulty. Some of the colours are changed. France is green in the Imports and salmon-coloured in the Exports. Holland is salmon-coloured in the Imports and blue in the Exports. Russia is yellow in the Exports and blue in the Imports. It may be thought that change in the colours is a trifling

matter; but nothing can be called trifling that attracts attention in the wrong place, and suggests differences where none exist, and young people are particularly sensitive with regard to consistency in colour. On the other hand, the comparative diagrams of Imports and Exports on the same two pages of the atlas are worked on exactly the lines I have recommended. Each year has a column to itself, but as the width of the columns is uniform, we have really a series of lines. We judge not by the areas but by the heights of the columns, and thus we get a good general impression of progress. When it comes to accurate details, we must fall back upon the actual figures which are supplied.

Psychologically it is not quite accurate to say that columns may be treated merely as lines. Our estimate of the width of columns is affected by the relative heights of the columns that are compared. A low column appears wider in proportion to a high column of the same real width. But this peculiarity need not interfere with the use of columns as illustrations of statistical relations, in one denomination. The only point we need to consider is the height of the columns. The area counts for nothing, so we can safely treat them as merely thicker lines than usual. A particularly useful form of columnar diagrams is that in which squared paper is used as the groundwork, and squares are blackened so as to form columns of various heights. Each column is in this case so many squares high, and the "permanent suggestion" of the squareness of the units prevents the question of breadth arising; though it must be admitted that in the case of a fraction of a square being filled up at the top of a column there is danger of a trifling disturbance through the breadth bias.

While it is true that quantities are better represented by straight lines[1] than by areas, there is the limitation that when there is a great disparity between the two quantities compared the mind may be unable to make the comparison. If instead of the squares in Fig. 7 we draw a line one inch long to represent the area of Scotland plus Ireland, and another twenty-five inches long to represent the area of India, it will be discovered that pupils find it impossible to make an accurate estimate of the relation between the two. In such cases the larger line must be broken up in some way, so that the ratio may be made manifest. One writer who wishes to represent by means of straight lines the ratio between the trade of the British Isles and the trade of the various British Colonies, represents the British trade by a line that is so long in proportion to the others that he has to fold it into what may be described as a spiral rectangle that has rather more than two and a half whorls. Within this rectangle the trade of India is represented by a line that is folded so as to make four-sixths of another rectangle. The Australian trade has a line that has to be folded into a sort of letter L still within the rectangle. All the other colonies have lines that can be placed within the big rectangle without folding. The effect is deplorable. In fact, I found it extremely difficult to get pupils to discover where the British line ended, to say nothing of

[1] In connection with the view that the straight line is the fundamental form of quantitative illustration, my friend Dr. William Garnett, the eminent physicist, refers to the fact that in Physics all measurements are ultimately reduced to divisions of a line. The galvanometer, the thermometer, the barometer all exemplify this. Even in the balance the line remains the standard, though, in this case, it is reduced to zero.

estimating how long it was compared with the others.[1]

Two principles should be kept in view when we are dividing up a line so as to use it effectively in illustration. The first is that we should always work by multiples of the smallest line to be included. Thus in the area-of-India illustration (Fig. 7, page 356) we should divide the twenty-five line into five lines each five times the length of the line representing the area of Scotland plus Ireland. Naturally if there is not a convenient multiple to include all that we want without fractions then we must adopt the nearest multiple. If the number had been twenty-six, we might either take nine as the multiple and give two lines and eight-ninths of another, or take five as before and add a fifth of another. The second principle is that we should arrange our lines horizontally rather than vertically, as it is found that the eye works more easily from side to side than up and down.

It is obviously this difficulty in dealing in terms of straight lines with widely different quantities that has led to the introduction of illustrations by areas. Rectilineal areas seem to lend themselves more readily to subdivision than do circular areas. But as we have seen in the *Handy Atlas of the British Empire*, this does not prevent the enterprising illustrator from utilising the circle. Indeed, this form of illustration is at present rather in favour. A circle is taken to represent some total, and is divided up into various sectors each representing a

[1] This is clearly a case where an illustrative drawing is necessary. The reader has probably a great difficulty in realising the page diagram that I have described. My reason for not reproducing the diagram is that I felt it to be rather unfair to ask a man to allow me to reproduce his diagram, merely to use it as an illustration of what to avoid.

specific part of this total. But here again it is very difficult to estimate the areas of the sectors. The usual way is to make an estimate of the relative areas of the various sectors by comparing the parts of the circumference cut off by the including radii. Considerable skill in estimating angular measurement may be acquired by a study of the face of the clock and the different positions of the hands. Limiting himself to the positions of the twelve hours, the student assumes the unit of the hour as equivalent to thirty degrees, and by estimating the position of the radii in relation to the fixed points of the hours, he can make a fair guess at the number of degrees included, and therefore of the proportion of the area of the circle included in a given sector. So skilful is it possible to become in this matter, that a friend of mine was able to detect by inspection a mistake of what he called "two-thirds of an hour" (that is, twenty degrees) in a diagram of this kind, and in another an error of only one-third of an hour or ten degrees. It is true that this is not quite an estimate of areas, but rather of positions on a circle. The estimate of the included area is really an inference.

Sometimes the circular diagram is used in a way that depends less on the area sense. The state of a particular business of some complexity, or of some Government department, in a given year is represented by an inner circle. Each succeeding year is represented by an outer concentric circle, and the increase or diminution in certain elements (sales, cases, prosecutions, deaths, or what not) is indicated by the protrusion of larger or smaller extensions of uniform shape, but varying size, from the original circle. If the concentric circles increase by a uniform lengthening of radius each

year, the protrusions from the original circle may be compared with each other on the same standard so long as their shape does not depend on the diameter of the circles. Oblong protrusions of uniform width may press into any number of concentric circles without being affected by the increasing diameters. We are, in fact, enabled to treat the oblong prolongations as mere lines. Ingenious people of course can introduce all manner of more or less useful complications.[1]

It may very reasonably be questioned whether the general weakness that we have observed in estimating areas is an essential part of human nature. It may well be that this is merely a department of experience that has not received its proper share of attention. Education has certainly done little towards training this particular mode of dealing with the materials presented by the outside world. Experiments have been made, it is true, but seldom on a large scale, or continued for a long time. Several years ago an enthusiast in education in the East of Scotland produced a scheme for the training of all our sense perceptions. On the analogy of Athletics, he called his system "Mentics." It was not widely taken up, but in one or two cases it was applied with great thoroughness and success. An essential part of the scheme was a training in the estimating of areas, and in one case at least in which it was applied the pupils developed quite a striking skill in estimating areas that happened to fall into the geometrical forms that had been used in their training. That is to say, the pupils could readily

[1] For a very interesting example of a form of circular illustration see the Report of the Minister of Public Instruction of New South Wales, 1908 (Physical Condition of Children).

arrange in order of area a number of cardboard hexagons, triangles, squares, and other regular figures. They were less happy in arranging in order figures that had not occurred in their regular exercises, but they did much better work even with irregular figures than any class of equally intelligent but untrained pupils. On the other hand, when the "mentically" trained pupils were taken into the fields they showed no unusual skill in estimating in acres the fields through which they passed; though looking at clearly marked fields from a height at some distance, they were able to compare with fair accuracy the areas of the different fields.

There can be no doubt but that under the rapidly approaching development of handwork in all its branches in schools the area sense will be much more highly cultivated than in the past, and even the bulk-sense will receive a certain amount of training. In the meantime, it is very difficult to get an ordinary pupil to understand how a shilling microscope can be said, without actual lying, to magnify "nearly 30,000 times," while a seven-guinea instrument claims no more for itself than four or five hundred times, or seven hundred at the most. We may point out to the pupil that the first is estimated in cubical content and the second in diameters. But after we have explained that the shilling microscope probably magnifies 30 diameters, or 900 (*i.e.* 30×30) area units, or 27,000 (*i.e.* $30 \times 30 \times 30$) cubic units, the pupil still finds a difficulty in taking in our meaning. To be fair to the good microscope, we must claim that it magnifies 343,000,000 times ($700 \times 700 \times 700$). But this seems to prove too much. The pupil clearly thinks he is being imposed on. This enormous figure, he thinks, must be a mere "way

of talking"—and he is right. As a matter of fact, except on the smallest scale, we cannot perceive cubical content; we must deal with it as a matter of inference. We are all familiar with the very common confusion between eight feet square and eight square feet. But confusion is much more general when we deal with cubic content. Most people who are preparing for their first ocean voyage make a very serious error in their interpretation of the "twenty cubic feet" or the "sixty cubic feet" allowed for luggage. Their minds are dazzled by a spaciousness in which an additional trunk or two are matters of no moment. Some people never acquire the volumetric sense, but have throughout life to take the shipping people's word for the surcharge. Others are amenable to the teachings of experience, and come to form a fair idea of what the phrase "sixty cubic feet" means when expressed in crates and trunks. But while this form of inference may be trained, the process is a part of substantive teaching, and ought to precede the use of the area- or volumetric-sense, as an aid in illustrating something else. Diagrammatic illustration offers a capital field for the sense when cultivated, but is not the field in which the cultivation should take place.

Pending the further development of the area-sense, it will be wise to limit the range of the diagrammatic. Since the great value of the diagram is its abstractness, it does not seem desirable to carry it into a region where many extraneous elements have to be considered. If we can represent all we want by means of straight lines, why should we seek for a more complicated medium? When we know the British Isles are only one-hundredth

part of the British Empire, why should we seek for illustrations that only hamper our freedom in dealing with this fact? After all, it is a quantitative fact, and should not be confounded with a qualitative one. It is true that after we have mastered this mere numerical ratio, we have a very great deal to learn before we can apply this knowledge intelligently. Mere area is not everything. But the necessary amplification of our knowledge is to be brought about by other forms of illustration. We shall understand the British Empire a little, but not much, better because we have learnt that a certain white circle is one hundred times as big as a certain black one. What is wanted after that is an application of the principle of Elaboration. So far as mere quantity is concerned, we have enough when we have the bald statement of the ratio.

One of the best illustrations of the application of the Jacototian principle "Learn one thing thoroughly and refer everything else to it" is to be found in a diagram (Fig. 12) that occurred in the Geography Book[1] on which I exhausted my boyish enthusiasm. Unfortunately my teacher did not attend to the explanatory note given at the foot. The diagram was always taken for granted, so that a large number of my class-mates never quite knew what was meant by the remarks that headed the various countries dealt with in the text. For example, under *Peru* one read "Latitude in the middle the same as the south of Lower Guinea," and under *Arabia* "Same latitude as from the middle of Morocco to the middle of Senegambia." In schools, however, where the book was properly used, there was continual reference to the diagram, with the

[1] *Modern Geography for the Use of Schools*, by Robert Anderson.

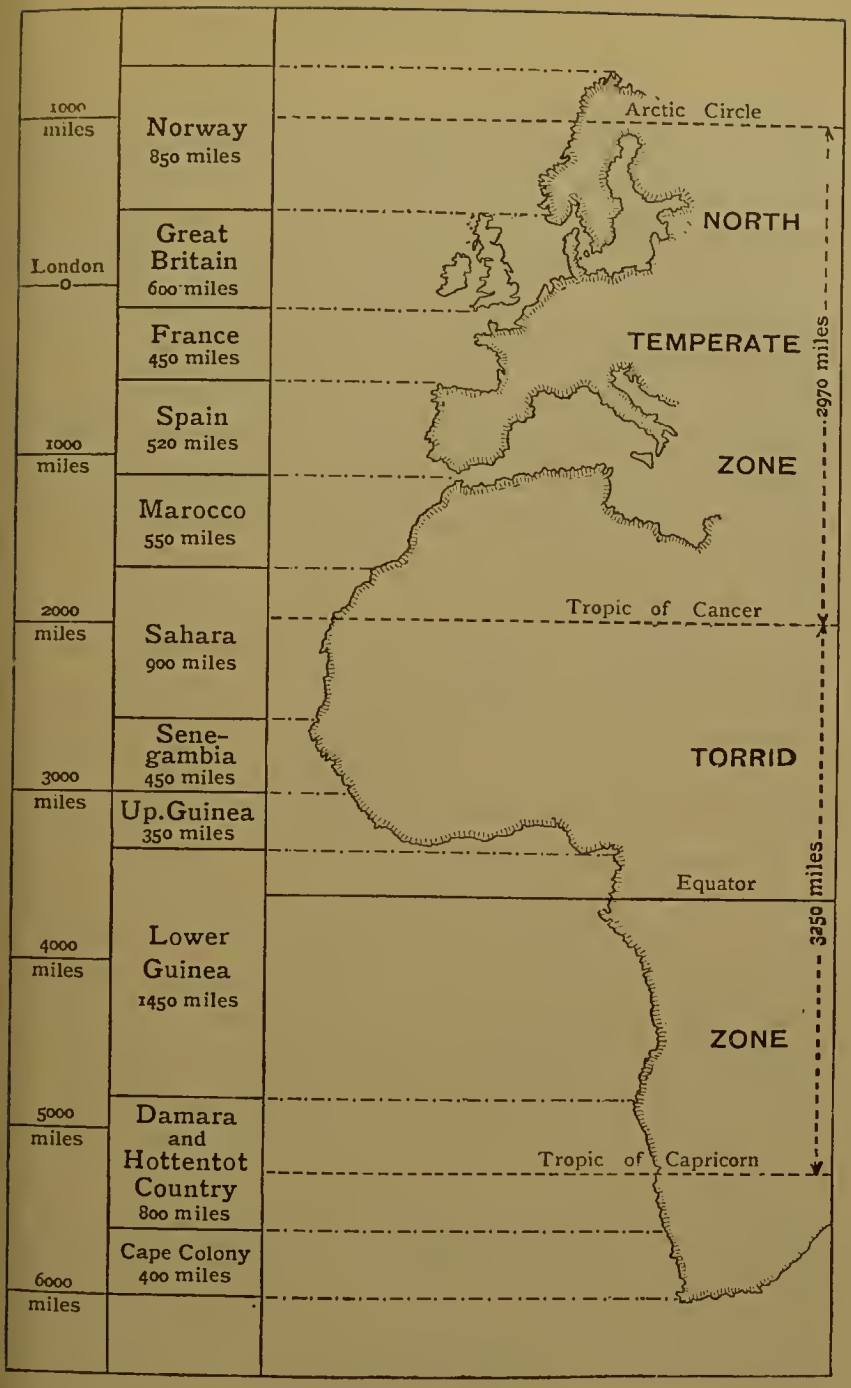


FIG. 12.

NOTE.—Teachers are requested to see that their pupils thoroughly master this brief lesson. The position of these eleven countries, which occupy the western shores of the Old World, is used to indicate the latitude of all other countries of the globe.

Reproduced by kind permission of Messrs. Thomas Nelson & Sons.

result that the pupils knew exceedingly well the relative positions of the different countries on the face of the globe. Naturally this is not a permanent state of affairs. It represents the pictorial stage, or perhaps better the pictorial aspect. There is not only room, but necessity, for the freer indication of position on the surface of the globe as indicated by latitude and longitude in the usual sense. But the diagram follows the laws of good teaching in beginning with the matter and ending with the form.

Speaking generally, a diagrammatic illustration should be reduced to its lowest possible terms. Caran d'Ache, Phil May, and other artists who dazzle us by the fewness of their lines seek quite a different effect from that proper to the diagram.[1] Their aim is to reach the maximum of suggestiveness with the minimum of representation. They invite the spectator to supply as full details as he can, and their success is measured by the contrast between the exiguous presentation and the exuberant mental picture. The diagram, on the other hand, seeks to confine the attention to one particular direction. It seeks to illustrate one relation. Caran d'Ache invites to an exercise in elaboration, the diagram to an exercise in elimination. A curious illustration of this invitation to elaboration was supplied some

[1] We are told that such artists make their first drawings in the ordinary way, filling in all the details so as to get a broad general effect. Then they proceed to discover which lines are essential, and by a gradual process of elimination they reach the effective skeleton that is finally reproduced. The same thing is true of writing. Mr. H. G. Wells, for example, tells us that he first writes down things as they come into his mind so as to "get some idea of the shape of" his subject. This first writing he calls "slush,' and it is ruthlessly cut down as the book approaches completion. The "slush" may amount to over 100,000 words, the completed book to 55,000 (interview in *To-day*, Sept. 11th, 1897).

years ago when there was a passing fashion in what was called "match drawing." This consisted in representing human beings by means of straight lines only, as a child might do by placing matches on a table, so as to represent the trunk, legs, and arms. The interesting point for us is the skill with which the draughtsman could suggest characteristic attitudes with this very limited means of expression. Fencers, boxers, walkers, runners were all reproduced in the penny illustrated magazines in such a way that the spectator had to fill in the details



Fig. 13.

whether he would or no. Sometimes match drawing is used for real illustration. Thus in a journal called *Cycling*, on July 22nd, 1894, there appeared the accompanying drawing (Fig. 13) to illustrate the difference of the attitude in riding the bicycle in the year 1890 and in the year 1894. It appears that between these two dates a lamentable degeneration had taken place, owing to the scorching habit. It is to be hoped that the accompanying sketches represent an exaggeration; what we are certain of is that they vividly represent the views of the magazine writer. The reader's attention is not distracted by the personal appearance of the riders or the qualities of the machines. Only the essentials appear.

There is here a certain amount of complication involved, since suggestion will naturally invite to potential elaboration. One may read as much anatomy and physiology and fashion into the figures as one's knowledge admits. But there is not a line in the illustration that can be fairly called non-essential. We have here practically reached the limits of suggestion by resemblance in a diagram.

There remains that kind of diagram that represents certain truths without indicating any sort of resemblance between the lines and forms used and the content of the complex that forms the illustrandum. All the newer graphic methods used in the teaching of mathematics belong to this class, and all the various schemes of plotting out results in charts. The accompanying diagram[1] (Fig. 14), for example, has no resemblance to either work or fatigue, yet it represents in a very efficient way the relation between fatigue effect and practice effect in determining the amount of intellectual work done in a given time. The abscissa O M represents the length of time the test lasted, in this case two hours. The ordinate O L represents the amount of work done. The work begins at A, and for a little time, through distraction and the effort to concentrate, there is a slight diminution of efficiency in work. At B the practice effect begins to tell, and the line gradually rises to C. At this point the practice effect is counterbalanced by the fatigue effect, that goes on increasing while the practice effect cannot increase further. The result is that there is a gradual falling off in the effectiveness of the work till we reach D. Here the prospect of a speedy release from effort, along with a

[1] Reproduced by kind permission of Messrs. Schleicher Frères, Paris.

quickening of the conscience in view of the approaching end of further opportunity, gives a little fillip to the student, and his effectiveness rises somewhat till the two hours end at E.[1]

The value of such diagrams is that we can envisage at one glance a large number of facts that would baffle any mind to deal with when

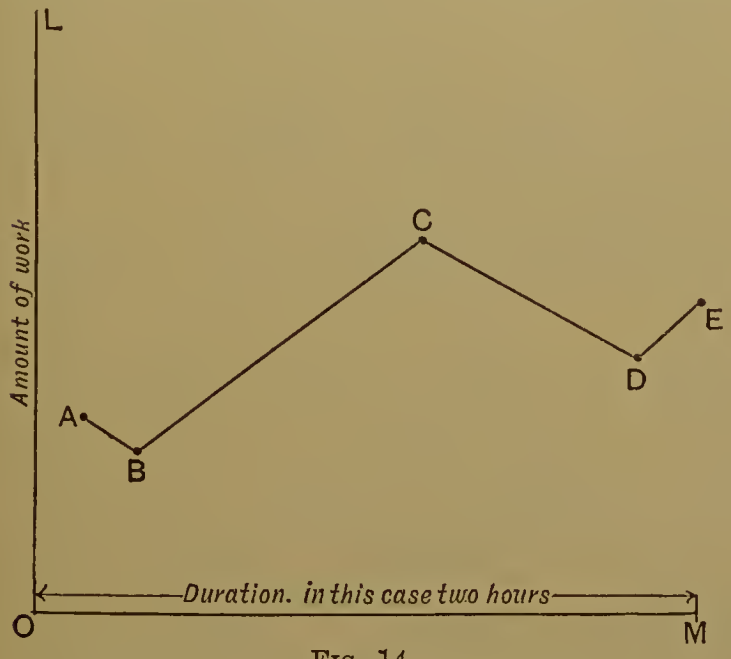


FIG. 14.

General progress of the speed of intellectual work.

presented seriatim. What Professor Karl Pearson calls an "observation frequency polygon,"[2] and Mr. Graham Wallas (from a vague memory of its shape) calls a "cocked hat,"[3] is one of the best examples of this graphic aid to thinking. Mr. Wallas quotes from Professor Marshall[4] in support

[1] *La Fatigue Intellectuelle*, p. 239, A. Binet et V. Henri.

[2] For illustrations see the periodical *Biometrika* passim, or Karl Pearson's *Chances of Death*.

[3] *Human Nature in Politics*, p. 133.

[4] *Journal of Economics*, March 1907, pp. 7 and 8.

of the statement that *qualitative* reasoning in economics is passing away and *quantitative* reasoning is beginning to take its place.[1] Among my post-graduate (science) students, many of whom have studied under Professor Karl Pearson, and most of whom have been influenced by him, I note an increasing tendency to think in diagrams. I find this line-thinking in all manner of unexpected places. An essay on the Shakespeare-Bacon controversy was full of "cocked hats," and in an essay handed in the other day on the interaction between pupil and teacher, I found the whole position set out in a sort of diagram of forces.

The now common school plan of recording such matters as temperatures, lengths of shadows, barometric pressures, school attendances has rendered the chart form of illustration familiar even to young children. It is true that these records are treated as processes of instruction rather than of illustration, and in the preparation of the curves there is training of a very valuable kind. Children are in fact being taught to think quantitatively. For our present purpose the important point is that pupils are now prepared by their substantive school work to understand all manner of chart illustrations.

We have seen already the value of the straight line as the best way of indicating a comparison in one single element as area, or length, or cost, or weight. But there is another way in which the straight line has a special illustrative value. In dealing with mental activity we find that sense of

[1] *Human Nature in Politics*, p. 143. Here Mr. Wallas gives a very amusing and enlightening illustration of quantitative thinking on the subject of the best size for a debating hall for the Federal Deliberative Assembly of the British Empire.

direction is characteristic of mental functioning. "When this 'direction' is determined for me," says Dr. James Ward,[1] "I am said to be passive, when it is determined by me, I am said to be active." There appears to be something more than mere metaphor in this psychological use of the word *direction*. Here is what Professor S. Alexander has to say on the subject:

> Now that I know what my brain is, I feel my thought occurring there, or, if not there, in some other part of my body. It is only as thus understood in connection with the bodily organism that I can say my mental activity is a movement with direction. But in this sense it is a movement that does occur in time and space. In other words, my mental activity is always qualified by what, on the analogy of local signs, I must call signs of direction.[2]

Without laying too much stress on the psychological basis thus suggested, it may fairly be said that the straight line in certain diagrams performs the functions of those signs of direction. In a genealogical table the lines really do direct the mind, which in following this direction shows itself to be in this case passive. It is a matter of common experience that the mind is dominated by arrows and other indications of direction as they appear in graphic form. That such indications are a saving of thought effort is proved by their use in the lowest class of graphic humour in which it is now customary to indicate the direction of a projectile by dotted lines, so that the indolent spectator may be saved even the trifling trouble of discovering from which direction the projectile came on its fun-making errand. The plain man's desire "to see a thing in black and white" is better met by a linear

[1] *Proceedings of the Aristotelian Society*, 1908, p. 226.
[2] *Ibid.* p. 220.

diagram than in any other way. Even when the letterpress is perfectly simple, the reader frequently likes to have a diagrammatic representation. In 1903 I published a little *Primer on Teaching* meant specially for Sunday School people. Naturally I wished to make the text as simple as possible, and thought that I had made it so plain that no one

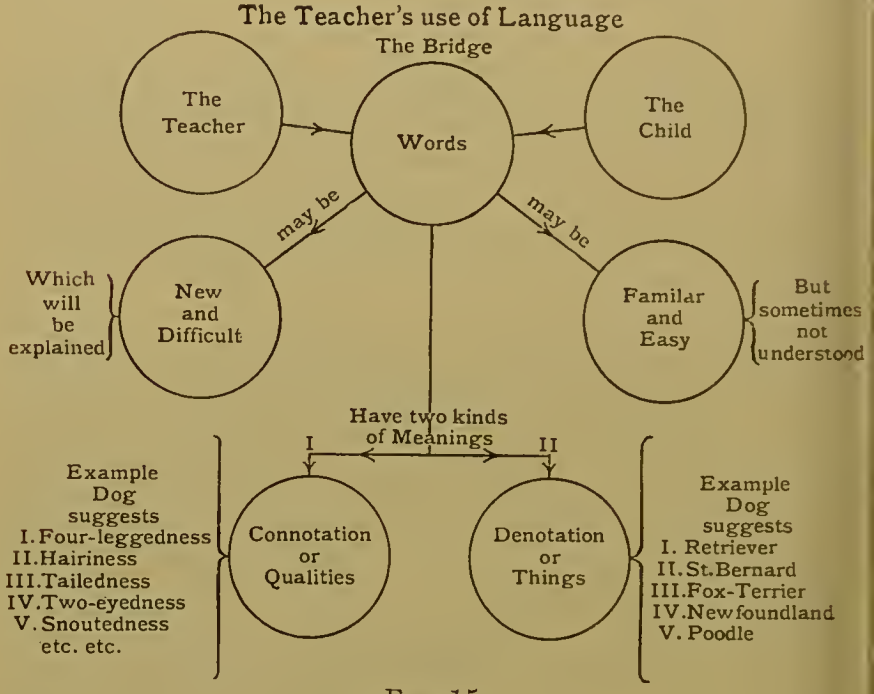


FIG. 15.

could need any help to understand its meaning. Some time after its publication I received from a clever engineer[1] in New York a set of eleven diagrams that gave a graphic representation of the main points in the various chapters. The engineer was the superintendent of a Sunday School, and told me that he found his teachers understood the book in a much more practical way after he had given them his diagrams. Fig. 15 reproduces one of these diagrams.

[1] Mr. John Calder.

On looking at it, one would think that the matter could have been equally well expressed in plain verbal exposition. But on putting the matter to several fairly well-educated Sunday School teachers, I found that they on the whole preferred to have the diagram—but were good enough to admit that it must come after the text.

We need be the less surprised, then, to find diagrams in such abstract books as Mr. W. Macdougall's *Social Psychology*. In introducing an admirably clear exposition of the neural bases of the sentiments of hate and love, he says: "It is, I think, helpful, at least to those who make use of visual imagery, to attempt to picture a sentiment as a nervous disposition and to schematise it crudely by the aid of a diagram."[1] As a matter of fact the diagram consists of a row of seven small circles each representing one of the primary emotional dispositions. The rest consists merely of certain lines and arrows indicating direction. These lines have a compelling power, and cause the mind to follow them almost in spite of itself. They are more useful in helping the student to understand than in helping him to recall details.

The mere presence of the lines helps to fix the attention. This is the justification of the habit some capable teachers have of making what seem quite unnecessary lines on the blackboard. They will put down a triangle A B C, with an arrow pointing from A to B and another from B to C, then go on: "Let A represent Walpole, B Queen Caroline, and C George the Third. The natural way of communicating with the King would have been for the Minister to speak directly to him; but as a matter of fact important communications usually took the route indicated by the

[1] *Social Psychology*, p. 124.

arrows." All that this triangular method implies has of course to be brought out by the teacher, but he feels that he has had a greater grip on the pupils' attention because of the apparently unnecessary figure. When I suggested to the teacher that it might have been better to use significant letters W, C, and G, he maintained —influenced, no doubt, by his memories of mathematics—that the more conventional the symbols

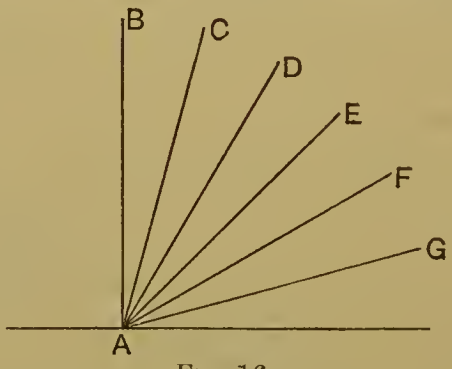


FIG. 16.

the better. To put the actual names Walpole, Caroline, and George would, he maintained, have spoiled everything. Here he differed from the originator[1] of the illustration—though strangely enough the teacher to whom I have referred seemed to regard the illustration as his own—who uses the significant initials W, K, and Q. The view that significant letters are objectionable is evidently adopted by the writers of the *Public School Latin Primer*, in which the solitary little diagram in the book illustrates *case* by means of letters without significance.

Case (*casus*, from *cado*) is, literally, a *falling*. Grammarians represented that form which a Noun takes when it is the Subject of a sentence, by an upright line as AB, and likened

[1] R. Somervell in P. A. Barnett's *Teaching and Organisation*, p. 171.

the other forms to lines *falling* away from the perpendicular at various angles; as, AC, AD, AE, AF, etc. These they called *Cases*; and their series, the *declension*, *declining*, or *sloping down* of the word. Afterwards, the Nominative or Subject case was called (with evident impropriety) Casus Rectus, *the Upright Case*, and the others (except the Vocative) Casus Obliqui, *Oblique Cases*; whereas the *Stem* (or Crude form) of the word is more properly the upright line, and the several cases, including the Nominative and Vocative, are branches deflecting from it. So, from the Stem *nuc-* (walnut-tree) the Cases are: N. V. nuc-s (=nux), Acc. nuc-*em*, G. nuc-*is*, D. nuc-*i*, Ab. nuc-*e*.[1]

Probably the influence of custom on the schoolmaster in making "Diagrams of Illustration" in Euclid had a good deal to do with the selection in this case of the first letters of the alphabet. At any rate, in actual exposition to a class experience shows that it is better to adopt significant letters. O is substituted for A, and S for B, thus O S represents the stem; then O Acc. would represent the Accusative, O G the Genitive, and so on. It would seem that the pupil can hardly understand the meaning of case much better from seeing his teacher draw seven lines from a given point; but in practice it is said that the drawing does actually help. Probably some at least of the advantage comes from the draining off of a certain amount of nervous energy on the part of both teacher and pupil, an energy that might otherwise interfere with the learning process, just as in thinking out riders in Euclid the pupil works more steadily when he has a pencil in his hand, even if he makes no use of it in the way of either drawing or writing.

[1] Page 154.

CHAPTER XVI

DANGERS OF ILLUSTRATION

As an ending to a question the words "Give Examples" are very dear to the heart of the examiner. With those who are called upon to write answers to examination questions the words are not quite so popular. The complaint of the examiners is that the examples given are stereotyped. If an example is given in a text-book it reappears with cloying persistency in the answers. Out of nine hundred answers to a question asking for an example of one word being run into another in reading aloud, over six hundred gave "this shrub," the actual phrase used in a then popular text-book. Very few candidates had the originality even to change the letters while retaining the actual example, as in "this stable."

Experience shows that there is a strong tendency to fall into ruts in illustrating any particular point. Ask a class for examples of sentences. If the first pupil says "Cows eat grass," the chances are that his fellows will go on mentioning what other animals eat. If we wish to provide reasonably varied examples for class-work we must consider beforehand which illustrations we shall use in a given lesson. It is the commonest thing in the

world to find a teacher depending for his illustrations on the spur of the moment. If he has a mind particularly well stored with matter on the subject he is dealing with, he may escape from the serious defect of supplying tiresome strings of more or less similar and eminently commonplace examples of the rules he is expounding. It is easy enough to supply almost unlimited quantities of examples of particular kinds of nouns and verbs, or of natural orders in Botany, or of islands in Geography. In writing on the blackboard sums to be worked out, the teacher finds that the numbers come without the least difficulty. In all these cases the connection between the rule and the example is so clear that no mistake is possible except through such culpable ignorance as is seldom to be found among teachers. Here one example does almost as well as another. The content of the individual example does not affect the general rule to be illustrated.

So far what may be called the hand-to-mouth method of illustration is innocuous, and is even advantageous, since it saves unnecessary labour. So soon as the content of the illustration becomes of importance, the method will be found to be full of danger. The teacher who carelessly dictates at random half a dozen English sentences to be translated into Latin to illustrate the construction of *cum* with the subjunctive, may lead to all manner of confusion among his pupils, because they find in the sentences other difficulties than those connected with *cum*, difficulties that have not been prepared for by any previous instruction. A teacher's brilliant scholarship is no safeguard against error here. All such illustrative sentences must be carefully edited by the teacher in the light of what he knows of the previous training of his pupils. No

doubt there comes at a later stage of instruction in Latin prose a time when the pupils must be prepared to deal with unedited English passages for translation into Latin; for at that stage they have a sufficiently wide knowledge of Latin construction to allow them to exercise a certain freedom. But even at this stage the master must not select his English passage entirely at random. Certain passages cannot be translated into Latin, since they contain words and ideas that the classical writers have not had the forethought to anticipate.

Some teachers escape the dangers of the hand-to-mouth illustration by more or less unconsciously acquiring a stock of illustrations that they stereotype and keep on hand so as to produce them on appropriate occasions. Great weariness often results for the pupils who have to submit to the same illustration without explanatory comments that might make it intelligible. As soon as the question of transitive or intransitive came up, a certain teacher might be relied upon to make the following remark, and no other: "The cat cannot sit the mat, therefore *sit* is intransitive." Years afterwards that teacher's pupils spoke with bitterness of that cat. The reproach of the stereotyped illustration is removed when it can be shown that it is a real touchstone of truth that may be applied to all cases within its sphere. For instance, there is a perennial difficulty among young students of French about which of the verbs take *être* and which *avoir* in conjugating their past tenses. Some text-books deliberately give lists of verbs that are conjugated with *avoir*, and no attempt is made to lay down any principle that may explain this peculiarity. This principle seems to be that where the action of the verb is followed by a corresponding state, the verb

être is to be used, in all other cases the verb *avoir*. The stereotyped test is in the form of the question: "If the subject has done so-and-so, is it so-and-so?" This is obviously obscure, so a particular case is taken. "If the subject has come, is it come?" If the answer is *yes*, then *être* is the verb, if *no*, then *avoir*. It may be simpler to adopt the form of the second person: "If you have done so-and-so, are you so-and-so?" "If you have eaten, are you eaten?" No; then use *avoir*. But whatever the form, it must enable us to discriminate between those cases in which a verb sometimes has *être* and sometimes *avoir*. Take the verb *descendre*, with the subject *le chef*. "If *le chef* has descended, is he descended?" Yes; therefore *être*. "If *le chef* has descended the dinner, is he descended?" No; therefore *avoir*. *Le chef a descendu le dîner*.

So with the simpler case of quotation marks in writing a dialogue. The pupil may be given the stereotyped question: "Did the speaker open his mouth and let out the very words in question?" If the answer is *yes*, then quotation marks must be used. With duller pupils, some teachers adopt the grosser device of making the pupils ask themselves whether the doubtful words could be represented within the bladders of words that are drawn as coming out of the mouths of persons in inferior comic cartoons. The method may be objectionable because of its associations with trashy literature, but so far as being stereotyped is concerned, no harm is done, since the illustration is of universal application.

In almost every subject the hand-to-mouth illustrator gets into trouble by demanding from his pupils knowledge that is not yet due in the course of their study. It is probably unnecessary to labour

this point here, for the reader who has taken the trouble to follow this book so far has given proof that he has enough interest in the subject of method to prevent his making the discreditable bungles that not infrequently mark the teaching of brilliant scholars who rely upon their mere knowledge of the subject to carry them through, without taking the trouble necessary to make their teaching efficient. The reader's danger may indeed be quite the opposite. Because of his interest in the theoretical aspect of his work, he may be inclined to over-elaborate his illustrations, and may thus fall into certain errors that are likely to interfere with the success of his teaching.

To begin with, there is the danger of over-illustration. Some teachers seem to regard it as an established principle that every point that arises must be illustrated, whether it offer any difficulty or not. What is perfectly clear already needs no illustration as a matter of exposition. A straightforward statement of fact dealing with elements that come well within the pupil's range should not be illustrated, so long as the teacher's purpose at the time is only to get the pupil to understand. Indeed, it is possible that by illustrating what needs no illustration, the teacher may cause needless difficulty to arise, especially in the minds of the more eager and attentive pupils. Accustomed to attach a meaning to all the teacher says, such pupils are apt to think that since he makes so much of the point he is labouring, there must be something in it which they do not yet perceive, and they may grope about for a meaning that is not there.

By the commonplace teacher the temptation to over-illustration is easily resisted. His danger lies

in quite a different direction. But there is a very real risk in the case of the zealous expositor. No limit can be set to the possibilities of illustration once the lust of the collector is joined to the enthusiasm of the teacher. Every keen expositor is a potential grangerite.

In our time the term "grangerite" has come to be applied to the commentator who summons illustration to his aid in dealing with a book already printed. That, however, does not cover his art, which includes everything bearing on the elucidation of the text. I use the word "grangerising," then, as a term for the general art of what may be called the methodised scrap-book—for in its very method it differs widely from the olla-podrida usually known by that name.[1]

The art, named after the Rev. James Granger, who began life in Dorset in 1723, is full of attraction, not to say temptation, for the industrious and ingenious teacher. When he is taking a class through one of Shakespeare's plays, and as a help in his preparation cuts up two cheap copies of the text and pastes the separate leaves each in the middle of one of the pages of a large manuscript book, so that he may fill the abundant margin thus supplied with notes of all kinds on the text, he may not know that he has set out on a grangerising expedition. He cuts out some critical remarks from newspapers or magazines and pastes them in his book. If he can get pictures, he naturally includes them in his collection. By and by it is clear that even the huge manuscript page is insufficient, and a new book is necessary. He is not likely to go to the excess that drove Lefèvre to grangerise Voltaire into ninety volumes, but he may very easily be carried away beyond the bounds of prudence. Kept within modest limits, a granger-

[1] J. M. Bulloch, *The Art of Extra-Illustration*, p. 10.

ised copy of a classic to be studied or a text-book to be taught is a valuable possession, both for the information it actually contains and for the mastery of the subject that its compilation helps to secure. But there is always the danger of the collecting interest getting the upper hand, and the book becoming an end in itself. Instead of illustrating the original text, it dwarfs that text, swamps it, drowns it. The teacher must never forget that as teacher his interest lies in expounding the text or other subject. His illustrations are to be illustrations of the original subject. The grangeriser very rapidly gets off the main line and goes on illustrating illustrations, till the real subject is left far behind. What the teacher must avoid is well exemplified in Hill Burton's caricature of the grangerite's methods of illustrating the familiar lines :—

> How doth the little busy bee
> Improve each shining hour,
> And gather honey all the day
> From every opening flower.

He pictured him starting with the poet, Isaac Watts. This would suggest all manner of bees, Attic and other, and all sorts of beehives would be appropriate, to be followed by portraits of Huber and other bee-collectors, and views of Mount Hybla and other honey districts. Burton poured good-humoured contempt on the process by drawing out the agony of subjects to be illustrated ; but in the forty years that have elapsed since he penned the *Book-Hunter*, the subject of the bee has been extended to a point more elaborate than Burton ever contemplated. To-day the exhaustive (and exhausting) grangerite would have to include, for example, a portrait of Maeterlinck, who has told us the story of the bee in terms of the most charming philosophy, to say nothing of Lord Avebury's many works, and the scientific construction of the beehive. Burton then went on to say that the grangerite would have to remember that there was once a periodical called the *Bee* edited by Dr. Anderson, who was the grandfather of Sir James Outram, whose career might be included. Finally, he genially suggested that, when the illustrator came to the last line, "which invites

him to add to what he has already collected a representative of every opening flower, it is easy indeed to see that he had a rich garden of delights before him." [1]

A French psychologist writing on the theory of laughter admits that he used to read the examples of fallacious reasoning in his text-book on Logic, as a sort of legitimate jest-book. George Eliot gives us a delightfully true account of the seductive charms of the matter supplied in the illustrative examples in the Latin Grammar. Maggie Tulliver

presently made up her mind to skip the rules in the Syntax —the examples became so absorbing. These mysterious sentences snatched from an unknown context—like strange horns of beasts, and leaves of unknown plants, brought from some far-off region—gave boundless scope for her imagination —the fortunate gentleman, whom every one congratulated because he had a son "endowed with *such* a disposition," afforded her a great deal of pleasant conjecture ; and she was quite lost in the "thick grove penetrable by no star." [2]

We have here a force with which every teacher has to reckon ; the examples always have been and always will be so absorbing. As a rule they are not in themselves dangerously interesting ; they usually obtain their power by contrast with the still less entertaining matter of the text. Even the publisher's advertisements at the end of the book are not without their attractions as a relief from what the book itself contains. Making all allowance for this unearned increment of interest that attaches to examples, we find that the legitimate attraction of the examples is a dangerous rival to the teacher. The way to meet the difficulty is not to make all the examples of the most uninteresting character, but to select them as far as possible from matter

[1] J. M. Bulloch, *The Art of Extra-Illustration*, p. 19 (published 1903). The original passage will be found in *The Book-Hunter*, Part I., Classification.

[2] *Mill on the Floss*, Book II. chap. i.

that has already exhausted its interest in other parts of school work. Let the teacher consider the wiles of the clever advertising tailor and learn of him. In a certain shop in West Central London, there appeared a little while ago a new set of wax heads to surmount the dummies that displayed the ready-made suits in the window. The new heads were exceedingly well made, and formed a very agreeable change from the wooden knobs that had formerly finished off the dummies. The passers-by were greatly interested and gave unstinted admiration to the type of head adopted. There was, however, one fatal defect from the point of view of the critical public. The whole thirteen heads were of exactly the same pattern ; in fact, they were the same head, cast in the same mould, coloured with the same pigments and by the same process, supplied with the same glass eyes, and the same curly brown hair. On being remonstrated with, the tailor admitted that his aim was not entirely disinterested. The heads were specially good in order to attract attention to his window. They were made exactly alike so as to exhaust very rapidly the interest of the onlooker, who, disappointed at the similarity, sought for and obtained the necessary variety by examining the different kinds of suits of clothes.

In the case of teachers who use as examples matter that has already exhausted its interest in other departments of school work, there is a double end served—old matter is revised, and a new interest is created in it, which new interest is of exactly the kind the teacher desires to arouse, for it is connected with the work actually in hand. The pupil is interested to know what the teacher is going to do with this familiar old fact that is being presented. The whole question of correlation is involved here.

Most teachers are now aware of the dangers of weariness that are implicit in the over-zealous use of correlation. But our present consideration recognises the loss of interest in certain parts of school work, and proposes to take advantage of this loss. Certain matter is selected because it has lost its intrinsic interest, and if in the process of teaching a certain amount of mediate interest is developed, that is all to the good.

One of the chief dangers of the use of illustration is connected with this problem of the incidence of attention. There is always the risk that the illustration will prove more attractive than the illustrandum. The attraction to which Maggie Tulliver yielded is not confined to examples. An illustration fails when it derails the interest of the pupils from the main lines of the lesson. In the case of certain material illustrations, such as models or pictures, the derailing of interest is so obvious that it at once attracts the teacher's attention, and he takes means to recall it to the main subject. This is comparatively easily done if he has the sense to allow the illustration to exhaust most of its primitive interest before he proceeds to use it as a mere illustration. It used to be a matter of professional pride with a class teacher not to let a particularly interesting object be seen till the moment came at which it had to be produced for illustration. No great harm resulted if when it was introduced the teacher allowed a reasonable time for the pupils to gloat over it before he began to demand their attention to its purely illustrative aspect. The skilful lecturer on presenting an attractive slide on the screen allows a reasonable time for the subsidence of that gasp of appreciation with its succeeding murmur of whispers that

welcomes every striking picture. When he does begin to talk, he takes care to deal with comparatively unimportant matters till the edge of the intrinsic interest of the slide is blunted. If the slide is really important as an illustration, he may introduce it at an early stage in his lecture mainly to rub off its intrinsic attraction. At its first appearance he merely calls attention to facts that are in any case attracting the attention of his audience; when at a later stage it reappears he is able to direct the attention of his hearers in the way he desires, for they are now able to concentrate on the line of secondary interest as brought out in the illustrative process.

Too frequently the derailing of interest is not anticipated by the teacher, because he has failed to consider the immediately preceding content of the minds of the pupils. Any reference to certain of the more urgent interests of the pupils may be an excellent way of getting up a secondary interest in some part of school work. Mensuration may be connected with the football field or the cricket pitch, hydrostatics with boating, dynamics with the proceedings in the gymnasium. But in all such cases there is great danger of derailing the interest from the school subject. No doubt it may be won back again, but in a case of class instruction, it is probable that the temporary aberration has caused at least a few pupils to lose some important link that they may not be able to catch up during the course of the lesson.

The teacher has to remember that every illustration he uses must run the gauntlet of divergent association in the mind of every one in his class. He can never be quite sure that the most innocent illustration may not derail the interest of some of his

pupils, even though he takes all possible precautions. But he ought at least to minimise the danger by doing all he can to remove temptations. For example, he must avoid the *arithmetical challenge* of which we have already had one or two examples.[1] Certain minds are so constituted that as soon as two terms of an arithmetical problem are presented they must proceed at once to work it out. If at one part of a literature lesson the master mentions that he first read *Lycidas* at the age of twelve, and at a later stage that it is now a quarter of a century since he first read *Lycidas*, a large number of his pupils will neglect the point he is making in speaking of the different effect of *Lycidas* on the boy and on the man; their attention will be taken up in calculating the exact age of the master. Young people are particularly open to the arithmetical challenge when it implies a certain amount of criticism of a statement made. Though it was an adult mathematician who made the following arithmetical criticism of Tennyson, it is quite in the schoolboy vein. In his *Vision of Sin* Tennyson ventures the statement :—

> Every moment dies a man,
> Every moment one is born.

The man of figures at once accepted the challenge and pointed out that if this were true, the population of the world would necessarily remain stationary, which of course was contrary to recognised facts. He suggested as an emendation the following :—

> Every moment dies a man,
> And one and a sixteenth is born.[1]

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[1] Pp. 250, 305 (and implicit in quotation, p. 332).
[2] Quoted by Paratus in the *British Weekly*, June 3, 1909.

He admitted that it was not absolutely accurate, but it was at least approximately correct. It is because this perverse mathematician takes such an unreasonable view that the story forms a useful illustration. The pupil ought to be thinking in terms of poetry; if he persists in thinking in terms of number, there is serious damage done to the lesson. Even when no reference to number is involved in the exposition, certain minds are tempted to introduce calculation. One of the students of an exceptionally slow lecturer at Oxford confessed that in the inordinate pauses during the lecture he acquired a habit of calculating what each pause cost him on the basis of so much for a course of twelve lectures of one hour each. The moral for the teacher is that Satan's Employment Bureau does not limit itself to manual labour.

Teachers should be very careful in their use of the allusive style. Any reference, for example, to a person or place without mentioning the name will often set up a disturbance that takes quite a long time to settle down. To refer to Milton in a lesson merely as "the author of the *Defensio Populi Anglicani*" may give satisfaction to a certain number of pupils who happen to know who is meant. But to certain others the reference will prove a stumbling block, for they will go on wondering who it can be, when they should be following the work of the class. In this particular case the average boy would probably not trouble much, for the reference is not in itself interesting to him. But let the teacher use some superlative descriptive reference, and dissipation of attention will necessarily follow. "The worst king who ever ruled England," "the author of the longest poem in the English language," are references

that will disturb any intelligent class. It goes without saying that it is a laudable thing to be interested in discovering the actual persons referred to in such statements. The trouble is that the interest is roused at the wrong time. We are so fond of rousing interest that we are apt to forget that it is as necessary to allay interest as to excite it. In order that the interest of the pupils in the main subject of the lesson may be maintained, all subordinate interests must be ruthlessly dissipated. The way to kill an interest is to satisfy it. Nothing must be left for the imagination to work upon. Everything must be represented with pikestaff directness, and the mind will seek interest elsewhere.

While writing the above paragraph I have furnished for myself an unexpected and involuntary illustration of my theme. No sooner had I written the words "the author of the longest poem in the English language," than I began to feel uncomfortable. I realised that I did not know who he was, and I began to wonder who he could possibly be. Milton wandered through my mind and distracted my attention from the main subject of the paragraph. I had an uneasy feeling that though the *Paradise Lost* was long, it was far from being the longest poem in the English language. I had a vague memory of having heard the phrase "the longest poem in the English language" applied to Drayton's *Polyolbion*. But there came to me the disquieting impression that I had somewhere read that one of the industrious early settlers in New England had outstripped Drayton. Could it be Michael Wigglesworth? Next I comforted myself with the reflection that all I had to do was to turn to some standard book on the subject of English

Literature and get the matter settled; so I was able to dismiss temporarily the troublesome interest in favour of the general interest, which was in any case the stronger. Had I been a careless pupil in a class with a sporting interest in superlatives, and little interest in what was going on at the time, it is probable that I should have continued to worry about that longest poem instead of turning to the main subject.[1]

As a test of the truth of the view here adopted, let the reader try to remember whether his attention was not a little dissipated, and if, indeed, he was not somewhat annoyed by the unfinished sentence "The most optimistic writer on education is . . ." introduced[2] in Chapter I. to illustrate the mind's tendency to anticipate what is coming. Since the hiatus has served its purpose, the reader is now entitled to the tardy explanation that the writer referred to is Helvétius, who boldly proclaims "L'éducation peut tout."

Under certain conditions the allusive style may be excellent in print, but when used in lecturing or teaching it ought to be limited to the most obvious allusions, allusions that are well within the range of the less informed of the class or audience, so that the main effect of the allusion will be to rouse that feeling of satisfaction that accompanies the recognition of an old friend under

[1] On referring to text-books, I found no help in settling the question; so I fell back upon an examination of some of the poems that might claim first rank. *Paradise Lost* reaches the modest total of a trifle over 10,500 lines. The *Polyolbion* attains to nearly 16,000. *The Ring and the Book* swells out to 21,133 lines. But the limit seems to be reached in *Festus, a Poem*, by Philip James Bailey, which, in its reorganised form (Fiftieth Anniversary Edition, 1893) reaches a total that on a rough calculation amounts to 40,800 lines.

[2] See page 15.

new circumstances. A typical example of the sort of thing that may perhaps be permitted in a book, but that must be excluded from oral teaching, is to be found in the extract from Madame de Coulevain in Chapter XI. of this book.[1] There we find allusions to "a king," and to "two of our great newspapers, one of our best reviews." At this point Madame de Coulevain's reader puts his finger between the leaves and leans back wondering who that king and what those publications can be. Unless from the point of view of piquancy the allusions are a mistake in exposition. If there were any indication of how the missing names could be discovered by the reader for himself, there might be some justification for the mystification, since it would rouse him to take a fair share of the work. But as they stand they only aggravate the reader by making him feel his ignorance, and—it is no extenuating circumstance to add—Madame de Coulevain's superiority. Apart from this unprofitable disturbance of mind, the same end could be obtained by saying merely that a king could be as bourgeois as the tenant of a flat, and that some of our great newspapers and reviews are bourgeois. In a lecture or lesson the hearer would not only be irritated by the unintelligible allusion, he would necessarily, from the distraction of his attention, lose a great deal of what immediately follows the derailing references. If the authoress means Louis Philippe, why not say so? The names of the two great newspapers and the review would be much more illuminating than the piquant riddle she has set us. No doubt in thus making our references specific we kill a certain amount

[1] See page 290.

of interest, but the interest killed is of the unhealthy, distracting kind; and it has always to be remembered that we are here mainly concerned with the didactic use of illustration.

An author may feel that it is worth while to aggravate his duller readers so long as he wins the admiration of the clever, and if he is prepared to pay the price, there is nothing more to be said. The irritated reader, on his part, is free to throw aside the tantalising book. But when it comes to oral exposition it is necessary to carry the whole of one's audience with one. We cannot, of course, as Dr. Johnson pointed out with some asperity, supply our hearers with understanding, but we are not justified in distracting what understanding they possess by leading it into blind alleys.

I have had occasion already to refer to the teacher's overgrown respect for accuracy. In certain forms of illustration this respect leads him into serious difficulties; for there practically emerge two kinds of accuracy, and these two kinds cannot be reconciled. He has to make a drawing of the earth as an "oblate spheroid." If he makes an accurate drawing, the pupils will be unable to notice any difference between his drawing and an ordinary circle, but if he flattens the polar ends sufficiently to make the true shape apparent, he has played havoc with the other kind of accuracy, and multiplied many times the paltry six-and-twenty miles by which the equatorial diameter exceeds the polar. Sir John Herschel may speak bluntly about circles representing the orbits of the planets, but knowing that the orbits are really ellipses, the teacher is in a strait between two. If he draws them as circles, he is inaccurate

qualitatively, for they are not circles; but if he draws them elliptical enough to make his class easily perceive that they are not circles, then he has to err quantitatively, for they are not so elliptical as all that. Clearly the teacher must be allowed sufficient quantitative exaggeration to make clear his qualitative distinctions. If his pupils are at a stage at which it is important that they should know that the earth is an oblate spheroid, then he must be permitted so to represent it as to suggest that particular form. It is quite a different matter when little children are sedulously taught that the earth is "nearly, but not quite a perfect globe." This is the same lust for accuracy that has canonised the additional two feet in the height of Mt. Everest — "twenty-nine thousand *and* two feet." Naturally, intelligent students will be warned when necessary exaggerations are made. They will be told, for example, that though the earth's orbit is elliptical, its major axis is not quite so big in proportion to the minor as the drawing would make out.

Another very real danger in the use of illustration is the tendency to carry over the illustration as a whole with non-essential as well as essential elements. A teacher wished his class to understand that for a particular experiment he was describing it was necessary to cut out an oblong piece from the middle of one end of a board. As some of the pupils had a difficulty in understanding what he meant, he explained that the bit cut out was to leave a hole in the bottom of the board so that when it was placed on end there would be an opening in it like the entrance to a dog's kennel. This seemed to satisfy the pupils, but at a later stage, when they had to make a drawing of the apparatus, several of them

made the board appear as a pentagon, like the gable-end of a house. They had carried the kennel comparison too far. What in this case could be tested by the sketches would in the case of merely verbal description probably have escaped detection; and with young children in particular it is probable that many of our illustrations are carried over bodily and incorporated in connections in which certain of their elements are quite out of place.[1] The teacher must be continually on his guard and must try to anticipate and avoid possible misconceptions of this kind. Nearly always he will find that in spite of all his endeavours some dull commonplace child has contrived an impossible combination that, had it been deliberately made, would be regarded as very ingenious. To meet such contingencies a certain amount of verbal pruning is necessary, but above all there ought to be a good deal of intercourse in the way of applying illustrations. A teacher in a city school in giving a lesson on the Charge of the Light Brigade at Balaclava, made a sketch-plan on the blackboard with the Russian guns on the right of the board and the formation of hussars represented by two vertical lines on the left. The class as a whole seemed to understand the state of affairs on the field, but in the course of discussion it came out that some of the boys (the average age of the class was 12 +) thought a mistake had been made in the position of the hussars. As they were represented, the boys maintained, they were charging either north or south instead of eastwards as they ought to do if they meant to get at the Russian guns. On probing, the teacher discovered that the double line had misled the boys. There was a cavalry barracks in the city, and when the troops passed through the

[1] Cf. the Castle misunderstanding, p. 110.

streets they always went two abreast because of the traffic. The boys had got it into their heads that this two-abreast mode of progression was the natural one for cavalry, and that therefore they would charge in this order. It was a revelation to them that the charge was made with such a wide front.

Allied to this error of carrying over non-essentials

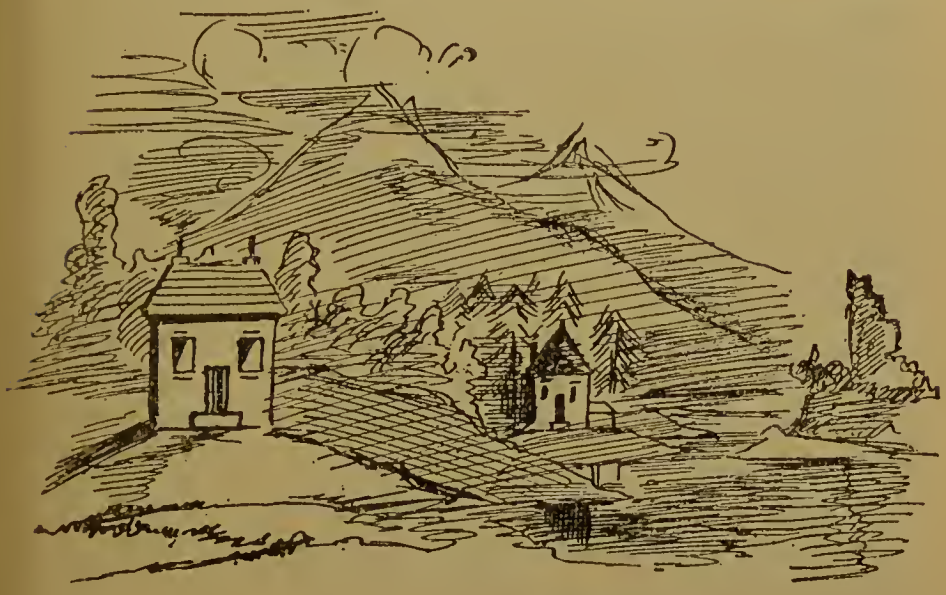


FIG. 17.

is that of arousing altogether wrong masses of ideas through some superficial resemblance. Beginners in landscape painting are warned against the little cottage on the hillside with its two tiny windows one on each side of the door, and the little doorstep, with the resulting resemblance to a grotesque human face. Not infrequently young people see a ludicrous aspect of some matter that to the adult mind appears to be of the most matter-of-fact character. "Speaking of babies," said the Sunday School superintendent, "I have a baby in my eye

now." He was quite serious, and did not at first understand what the youngsters found to laugh at in what he regarded as a very commonplace statement. Occasionally private jokes of this kind interrupt the attention of individual pupils, but it is the business of a good teacher to anticipate and provide against any such misapplication of ordinary words, so far as such misapplications are likely to affect a whole class. The teacher's safety here depends upon his knowledge of the pupils' mental content. Unintentional jokes in class are always the mark either of ignorance or of bad psychology.

Illustrations are often put in what the illustrator regards as a striking way, and yet are apt to mislead the pupils because of their very vividness. I have heard a teacher, in seeking to give his class an adequate idea of the size of London, make the statement that if all the houses in that city were placed end to end they would reach right round the earth, following the equator. In dealing with the class afterwards I found that the general impression produced was complicated by an incongruous picture in the pupils' minds of an interminable street, with only one side to it. Quite a number of the pupils had the literal objection that most of the houses would be flooded, as the equator was for most of the time over the ocean. On asking the teacher how he got his data for the measurement, he frankly confessed that he had no data, but "thought it would be a very effective way of bringing home to the class the enormous extent of the city." He further wanted to know, "morals apart," what objection I had to the illustration. The objection is indicated in the incongruity brought out above, and also in the mistaken notion that in some way or other the imagination of the pupils is aided by the

picture of this straggling street. As a matter of fact, the figure suggested great extent, but nothing more. It carried the pupils far past the Threshold of Stun.

A companion picture to that supplied by this ingenious teacher is to be found in a text-book of geography that seeks to emphasise the progress of London in this way: "A house rises out of the ground every hour of the day; a village of more than three hundred persons is added to its population every day."[1] This has obviously no pictorial value. We certainly do not want to figure forth the hourly emergence of a completed house, and the very name of a village suggests something antipathetic to the city spirit. The mere statement of a daily increase of three hundred inhabitants is sufficiently clear without the obscuring figure. So far as the figure is pictorial it is inaccurate. The population does not increase in that good-naturedly uniform way. The figure interferes with the pupil's chance of clearly understanding the theory of averages. As a matter of fact, in actual experience I have found that quite a large percentage of those to whom I have presented this illustration have at once accepted the arithmetical challenge and multiplied 300 by 365 to get the annual increase, and have maintained that the resulting 109,500 was much more stimulating than the daily village.

There may be cases at a very low stage of intelligence when a crude illustration of a pictorial kind may enable a person to understand in a very inaccurate and incomplete way something that he cannot otherwise understand at all. To this class belongs the ingenious figure by which one Italian rustic conveyed to another who was puzzled by the

[1] Meiklejohn, *The British Empire*, p. 49.

telegraph, some conception of the possibility of what a man does at one end of a wire producing an effect at the other. Starting from the well-known fact that if you pinch your dog's tail the bark issues from the other end, the expositor invited his friend to imagine that his dog grew long enough to reach from Milan to Rome, having its tail end in Milan and its head end in Rome. It then became clear that if you pinch the tail in Milan the bark will take place in Rome.[1]

In dealing with Exemplification it is obvious that the elements found in the illustration must be cognate with those found in the illustrandum. But when we are dealing with analogical illustration it is desirable that the material should be different in the two cases. This is manifestly true in the aesthetic use, but it also holds in didactic work. It is a mistake to use exactly the same sort of material in the illustration as is found in the illustrandum, unless the very fact of this community of material is to be utilised as a part of the illustrative process. If you turn to Chapter V., p. 130, you will find a case in point. There I wished to illustrate the weakness of the negative *not* as against the positive suggestion represented by a noun or a verb. Turning my thoughts to the Latin Grammar for an example of two terms often confused with each other, I found the words *non* and *ne* had arisen in my mind. They were probably suggested by the fact that I was dealing with the subject of negatives at the time. In themselves they form quite a good illustration, but as soon as I re-read the passage I saw

[1] The story ends here, but we can imagine the triumph of the dull one in pointing out the impossibility of getting through a message from Rome to Milan, and the intelligent one's satisfaction in suggesting an additional but inverted dog.

that there was a certain confusion likely to arise in the reader's mind. He might very naturally think that the Latin negatives *as negatives* had something to do with the general subject of the paragraph. In any other book I would at once have changed the illustration to some other two terms—perhaps *scire* and *cognoscere*—but an example of an actual blunder in illustration in the very act of treating of illustration was too useful to be thrown aside, so I let the blunder stand. Further, no reference was made to it in the earlier chapter in order to give the reader an opportunity of testing at a later stage whether he could remember any slight confusion having arisen in his mind at the time.

A final danger of the use of certain forms of illustration is said to be the tendency it has to make the pupils dependent on illustrations for their actual thinking. They become incapable, it is said, of doing any thinking at all unless suitable illustrations are supplied. They never trouble to deal with a generalisation till it is followed by illustrations. But it is surely undesirable that pupils should be encouraged to accept generalisations without examples, and sufficient cautions have been already given against allowing the pupil to adopt a purely passive attitude in respect of illustrations. The active reaction of the pupil being secured, he will of necessity provide certain illustrations of his own. Indeed, the supplying of fresh illustrations by the pupil is one of the best ways of his securing a mastery over the illustrandum.

CHAPTER XVII

THE TORPEDO SHOCK

In Plato we find Meno, after being treated on the aggravating Socratic method, driven to complain :—

> O Socrates, I used to be told before I knew you, that you were always doubting yourself and making others doubt; and now you are casting your spells over me, and I am simply getting bewitched and enchanted, and am at my wits' end. And if I may venture to make a jest upon you, you seem to me both in your appearance and in your power over others to be very like the flat torpedo fish, who torpifies those who come near him and touch him, as you have now torpified me, I think. For my soul and my tongue are really torpid, and I do not know how to answer you.[1]

This is a passage that touches closely all of us who concern ourselves with the theory of method in teaching; for there is a certain danger that in setting forth more or less elaborate theories we may induce a mild form of intellectual paralysis in the teachers whom we seek to influence. After learning the numberless possibilities of going wrong, and the small chance of hitting upon the absolutely right way to deal with any particular case that arises, the student of method may not unnaturally become discouraged. There are not lacking people who say that to study method is to acquire knowledge that is not only of little use but is positively noxious.

[1] *Meno*, 80 A. Jowett's English.

Their attitude reminds me of the indignant protest of an old college acquaintance of mine, a medical student, who had just come down in his anatomy. "What's the sense in knowing every miserable nerve in the neck. There's Launceston knows 'em all, and is so nervous he's afraid to put in his knife in case he severs some of 'em. I don't know 'em, so I've confidence. I stick in my knife, and there you are." It need hardly be said that Launceston was nervous by temperament, and not because he was the medallist in anatomy. Real positive knowledge gives power and confidence. The man with wide and accurate knowledge is not afraid to give an opinion and act upon it; though he has no monopoly of this courage.

Nevertheless, there is a certain danger attending the close study of method. All the positive principles mastered are of direct service in practical work, and your hurriedly trained person with little theory and a great deal of practice is only too willing to lay down the law and put it into immediate operation. But the thoughtful student who looks all round the subject, and notes this defect and the other even in methods that are on the whole excellent, has not the certainty of his less critical fellow. The man of criticism is always less confident than the man of action. It is important, therefore, that critical study should be accompanied by the corrective of vigorous practice. The work of the study must be brought to fruition in the class-room. But this is not quite the same thing as to say that the student is to carry his theories with him and painfully apply them by a conscious effort in front of his class. I have seen a man fishing in a pond in Buckinghamshire with a book by his side with the alluring title "How to Angle." To

this he referred when matters became critical; but he caught no fish.

In the stress and strain of the class-room the teacher must be independent of the book of method. I have no doubt that a great deal may be learnt about angling in the study, but the riverside is not the place to continue the study as study. This is by no means an admission that those depressing critics are right who maintain that in education theory and practice cannot be harmonised. "Theory is all very well in the study, but when a man gets before a class . . ." This sort of sentence is usually left unfinished, which is a pity. It would be pleasant to have a frank statement of the acceptance of rule of thumb.

As a matter of experience there is no difficulty in combining theory and practice, but the combination cannot be made in the mechanical way that lends itself to easy registration in an educational book. The matter was put epigrammatically, but with a different kind of truth than that the epigrammatist intended, in the complaint: "So far as I can gather, students of method learn laboriously certain principles that they forget the moment they are face to face with a class." For the outside observer this is a sufficiently accurate description of what takes place; but the inner meaning of the change of attitude is apt to be overlooked by the casual person. A better description of the same phenomenon would be to say that the moment the student of method gets before a class he loses consciousness of the theoretical principles he has been studying. It does not follow that those principles have lost their influence. It is all a matter of the incidence of consciousness. Too frequently it is true that theoretical considerations do obtrude themselves on

the consideration of the inexperienced teacher when he should be giving himself up entirely to practice. This means that he has not mastered his principles, and therefore is unable to forget them in the moment of application. A man who has been trained by a proper combination of theory and application of theory gradually acquires the right to forget all about theory when he is engaged in practice. His theory has become a part of himself, and affects his activities even when he is not at all thinking of theory. The facts of theory have become the faculty of practice.

One of my students told me the other day that she did not believe she could begin a sentence with the word *And*, even if she were writing in her sleep; so thoroughly had this part of the teaching of the theory of composition been assimilated. She remembered that the teacher had given her a great many reasons why no sentence should ever begin with the word—reasons that many modern writers would dismiss with scant ceremony—but these she could rather guess at than remember; the important point is that they had consolidated themselves into an inveterate rejection of the conjunction as the first word in a sentence.

This little chapter is added mainly to reassure readers who may be disturbed by the criticisms that have been made of certain illustrations that are not in themselves very bad, but are not so good as they might be. The reader in his modesty may protest that he will be only too glad if in the strain of strenuous teaching he can evolve such good illustrations as are held up as warnings in these pages, and may feel a little uneasy lest in the moment of action some memory of criticism may arise and torpify him. From this point of view illustrations

must be regarded as of two distinct kinds; those that are prepared for before the lesson, and those that are summoned on the spur of the moment to clear up more or less unexpected points as they arise. For confused or careless illustrations of the first class there is never any excuse; but for those of the second class there must be great allowance made. Still, the more practice the teacher has in preparing good illustrations before lesson, the greater his power of improvising illustrations that do not break any of the principles to which he has given his assent. In teaching we must let ourselves go; the practical interests of the moment must dominate everything. But, after all, teaching is not a mechanical process. We do not need to leave our minds at the door of the class-room as the Mohammedan leaves his shoes on the mat before entering the mosque. A trained rhetorician addressing a public assembly does not think of the laws of rhetoric as he makes his appeal. But he does apply them. The teacher must be able to think on his feet; must be capable of changing an illustration in the process of making it; and must all the while depend upon the paid-up capital of his theorising to keep him straight. No doubt he will often make mistakes, and will wonder afterwards how, knowing what he did, he could have made this blunder and that. But as the result of his studies he will find that in the main he is right. Every blunder he makes gives him something to consider after the lesson. But it is to be used in warning him against repetitions of this error and its like, and in strengthening his grip of the positive principles of his art, not in discouraging him, and sapping his confidence in himself.

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